

"FOR THE SPECIALIZED COMMUNICATION RADIO AMATEUR"

# AMATEUR TELEVISION MAGAZINE™

SEPT. 1982

VOLUME 12 NO. 9

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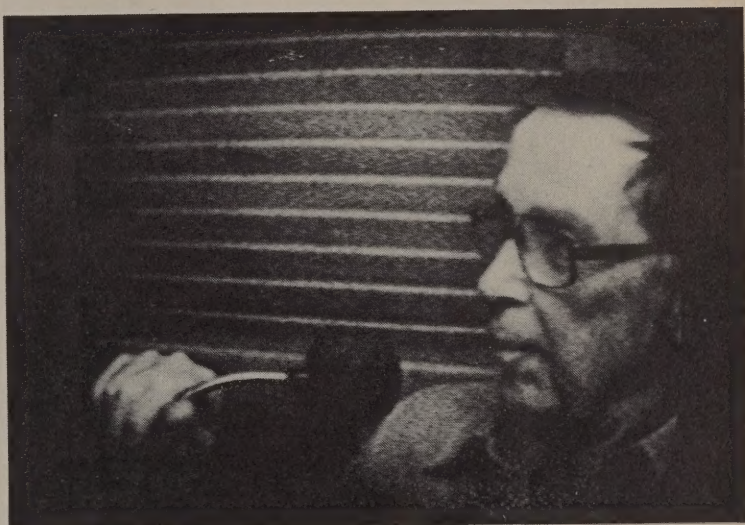
"OUR 16TH YEAR"

\$2.00

## 16 YEAR COVERAGE OF AMATEUR TELEVISION A5 MAGAZINE CELEBRATES WITH SPECIAL EDITION

### 56 PAGES!!

- United States ATV Society
- New FSTV "On-Carrier" Receiver Circuit!
- East Coast Conference Test Results
- Hitachi GP41D Color Camera Review!
- TVRO - Part 7 by WA6RDA
- PSF-432 ATV Filter Test Results
- "A5" Rebuttals "Worldradio" SSTV!
- Robot 400 Single Frame Color Mod!
- BSA/SSTV Special Event Station — W2GND
- SSTV Specs and Technology — K6AEP
- RFI and RTTY — K9GWT/K1TX
- 15 Year A5 Master Index!
- A5 Classified Ads
- And Much More



K9KKL Springfield, IL. FSTV To WBOZJP St. Louis MO. 110 Miles DX



West-

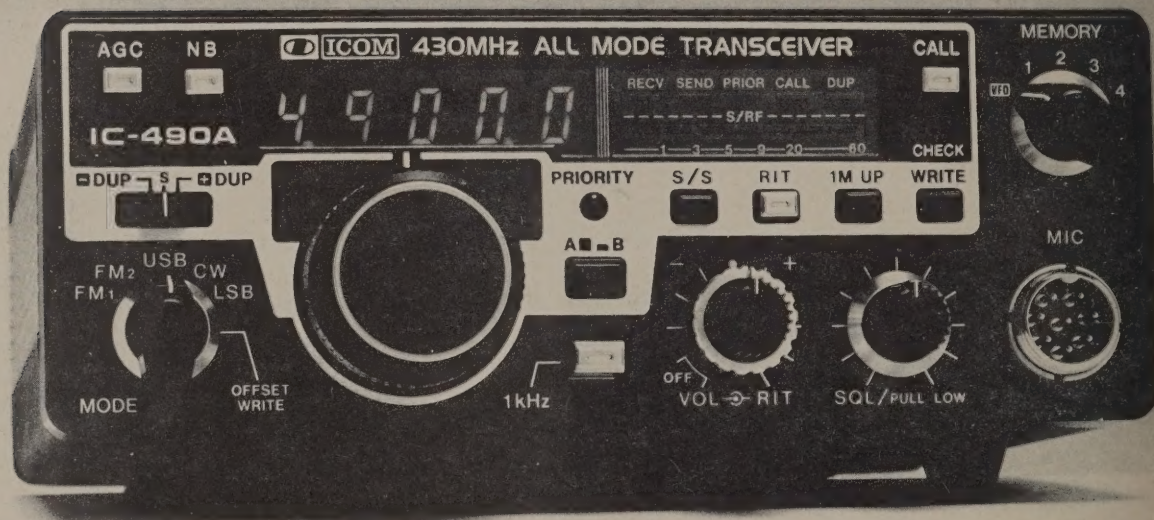
DJ 11J

Germany



# ICOM IC-490A

## Space Age Communications



The IC-490A transceiver provides many desirable base station features in a mobile package. This compact, high performance multimode radio features FM, SSB and CW (CW monitor included) to satisfy your needs in the 430-440 MHz region.

The IC-490A provides rapid QSY and accurate frequency selection in the 430 MHz band with tuning rates of 25, 5 and 1 KHz in FM; 5, 1 and 0.1 KHz in the other modes. Duplex offsets are adjustable in 100 KHz increments.

Two VFO's, priority call frequency, 1 MHz up button and 4 memories mean convenience in quickly selecting important frequencies.

Scanning features include full band scan, programmable band scan (scans between memory 1 and 2) or memory scan.

Using internal switches, the IC-490A will resume scan after an adjustable time delay, resume scan after carrier drop, sense busy or empty channels, and control scan speed.

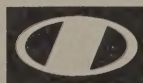
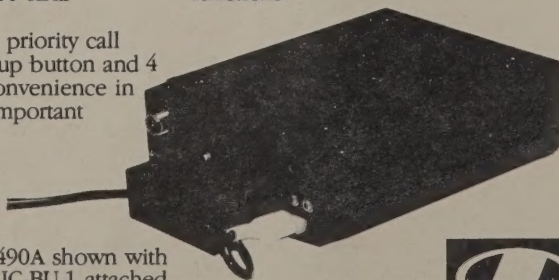
Use the call button to automatically select a frequency designated as the primary channel overriding other transceiver functions.

The IC-490A has a highly visible green LED readout for use over a wide range of ambient light conditions. Also, there are LED annunciators for receive, send, priority, call and duplex, as well as an LED meter. For receive on SSB, AGC speed and noise blanker are controlled from the front panel. Memory backup is available with the optional IC-BU-1 memory backup unit.

With 10 watts output in a 6 11/16" wide x 2 1/2" high x 8 5/8" deep package, the very compact IC-490A gives you multi-featured operation for your entry into the 70 cm band.

Included with the IC-490A is the new IC-HM11 microphone for remote up/down frequency control. See the new IC-490A at your dealer today.

IC-490A shown with  
IC-BU-1 attached



# ICOM

## The World System





## "OFF THE REEL" A5 Editorial Comments

### "OUR 16TH BIRTHDAY!"

It doesn't seem like a whole year has went by since I purchased the magazine from Henry, but I guess it has. As I hope you have been able to tell, we are devoted to Amateur Television first and then the other modes of Amateur specialized communications. There were 10 issues since September 81, 48 pages average per issue (including this special issue) totaling 472 pages (including ads) in comparison to only 172 pages (6 issues) the year before 80/81. With a full volume of 12 issues for the 82/83 season, we will probably print somewhere around 592 pages. That's roughly 3 times the amount of material you the subscriber were getting before! I think you'll agree, we have done what we promised to do. Many letters come in asking for more coverage of Rtty. Satellites, Facsimile and Computers. As much as I wish we could, we do have to remain in budget and always keep the ratio of ATV coverage about 75% of the magazine (FSTV/SSTV). There are other fine periodicals that cover those modes and we will try to publish only those non-ATV articles that seem to be of timely importance or are related to ATV operation. I'd like to especially thank Henry Ruh during the "transistion" period and Tom O'hara for "guidance. Together, with all you ole'timers, we have managed to keep A5 alive and growing.

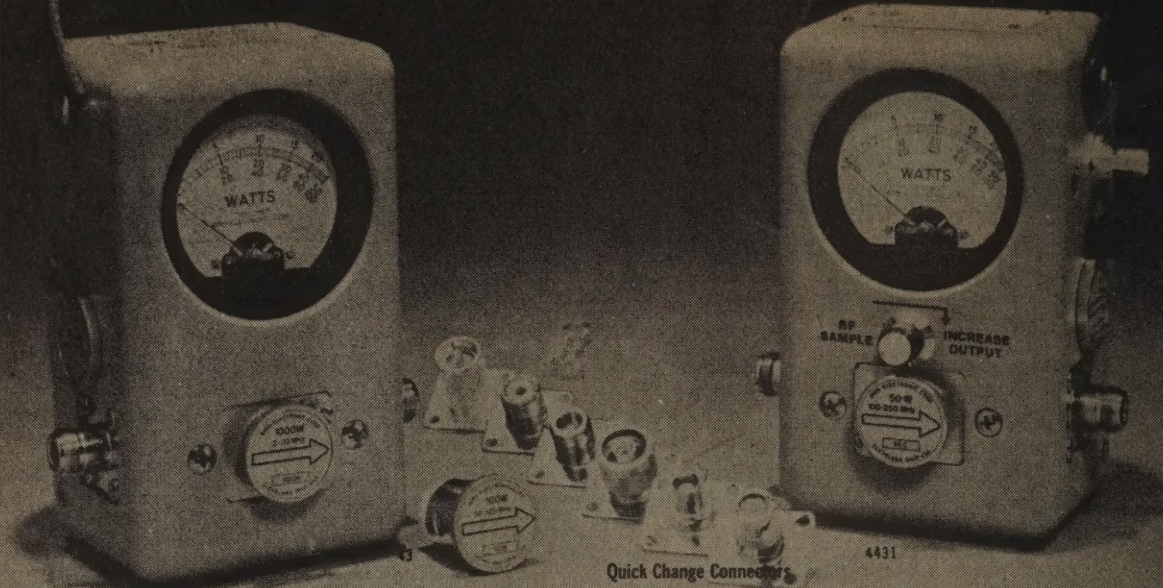
### UNITED STATES AMATEUR RADIO TELEVISION SOCIETY

If there is one thing that really stands out in working, corresponding and covering the ATV modes this past year with A5, it's that ATV is the most dis-organized organization I've experienced! Depending upon which part of the country you are living & operating, there is vertical vs. horizontal polarization, sub-carrier vs. on-carrier modulation and as if that wasn't confusing enough-everybody is literally scattered all over the place as far as coordinating secondary frequencies including FM and SSB! I use to think the "challenge" was in the lossy coaxial cable or the UHF propagation openings, but it isn't so much that as it is "to find ATV'ers during openings" and to get together with them to work them! The midwestern states does exactly the opposite as the west coast and the eastern boys seem to be somewhere in between. I'd like to see one of you knowledgeable ole'timers write an article on how this all got this way? With Amateur Radio as a "secondary" user to the 70 cm. band and the AMSAT fellas breathing down our backs, I think 1983 had better be an organizing year for ATV'ers or we will awake one morning without our beloved band to operate. I have approached some of the "leaders" of this industry as to their thoughts on forming a U.S. ATV Society comprised of a non-profit organization devoted to setting standards and recommendations on political situations concerning the ATV modes. There are many pros & cons in this issue. What are your feelings? This could possibly be the biggest step for ATV since getting approval to operate from the FCC just a few years ago. Write and state your feelings and suggestions.

### A5 "NEW SUBSCRIBER DRIVE" ON - GET A "BUDDY" SIGNED UP AND GET YOURS EXTENDED!

During the months of September and October, we are pushing for more A5 subscribers. The more subscribers, the more support and finances resulting in better and bigger issues! Like the 56 page format? Help us out and it will become permanent! We are asking your assistance...here's how you can help; There are alot of past A5 subscribers who quit taking it for one reason or another. Please "tell" them how A5 has changed in the last year! Some of you are loaning or passing along your discarded A5's to friends-sign them up! And, there are many out there who just don't know about A5. Send in your "buddies" 1-year subscription (\$20 US) to us along with your name, address, city, zip and renewel date and we will extend your subscription by 6 months! No limit to "new" subscriptions and extended renewel dates. How's that for incentive? Now get out there and show them copies of A5! 73's and enjoy! -QCD





## The indispensable BIRD model 43 THRULINE® Wattmeter

### Read RF Watts Directly.

0.45-2300 MHz, 1-10,000 watts  $\pm 5\%$ , Low Insertion VSWR—1.05.

Unequaled economy and flexibility: Buy only the element(s) covering your present frequency and power needs, add extra ranges later if your requirements expand.

**Table 1**  
**STANDARD**  
**ELEMENTS**  
**(CATALOG**  
**NUMBERS)**

Power Range	Frequency Bands (MHz)					
	2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H	—	—	—	—	—
5000 watts	5000H	—	—	—	—	—

**Table 2**  
**LOW-POWER**  
**ELEMENTS**

1 watt	Cat. No.	2.5 watts	Cat. No.
60-80 MHz	060-1	60-80 MHz	060-2
80-95 MHz	080-1	80-95 MHz	080-2
95-125 MHz	095-1	95-150 MHz	095-2
110-160 MHz	110-1	150-250 MHz	150-2
150-250 MHz	150-1	200-300 MHz	200-2
200-300 MHz	200-1	250-450 MHz	250-2
275-450 MHz	275-1	400-850 MHz	400-2
425-850 MHz	425-1	800-950 MHz	800-2
800-950 MHz	800-1	—	—

## Read RF Watts AND Sample RF Signals

The new THRULINE Wattmeter model 4431 offers all the power measurement functions and versatility of the model 43 (above). It also provides a variable RF signal sample for use with frequency counters, scopes, spectrum analyzers, etc. at the same time power tests are made.

The amplitude of the RF sample is adjustable between -15dB and -70dB by a control knob on the front of the wattmeter.

115 Bellarmine

Rochester, Michigan 48063



We accept  
Master Charge  
VISA



### Quick Change Connectors

## Read RF Watts AND Sample RF Signals (cont.)

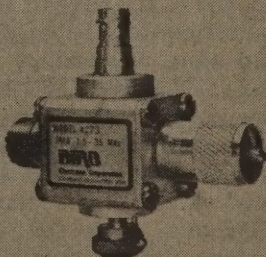
Max. Power Rating is 5000 watts (2-30 MHz) and 1000 watts (30-1000MHz). VSWR with RF samples -30dB or lower is 1.07. Model 4431 uses Table 1 and 2 Plug-in Elements.

QC-Quick Change Connectors avoid the use of performance degrading adaptors. Order spare QC Connectors for model 43, or 4431. These models are shipped with the N-Connector shown, unless ordered otherwise.

## New: Variable RF Signal Sampler

For RF signal observation on a scope, for spectrum analysis, or for frequency counting and control.

Model 4275 produces at the BNC port an unrectified sample adjustable between 35dB to 80dB below main line signal. Usable range: 20 to 1000MHz up to 1000 watts.



Model 4273 for lower frequencies (1.5 to 35MHz) is adjustable between 40dB to 70dB below a main line maximum signal of 5000 watts.

Level settings can be locked on both samplers.

Insertion VSWR—1.1 max. 2-512MHz  
1.25 max. 512-1000MHz

Connectors—QC-Type as specified (choice of connectors determines price).

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## "Letters To The Editor"

P.O. Box H, Lowden, Iowa 52255

"How in the world did things get so messed up with different antenna polarizations in different parts of the country? Some use vertical and some use horizontal polarization. Why can't we all get together? Just when did things get so goofed up?" -Russ KB9GJ-Greyville, Illinois (Editor) Hey, Russ, the \$64 million dollar question! You tell me? I am as confused and frustrated as you are! We have a group of ATV'ers here in our workable area (40 miles away) that remain on vertical polarization in spite

of the entire "midwest" being horizontally polarized. The real losers are the newcomers who are caught in between and don't know which way to go. Apparently, it has always been pretty much an "area" thing. The West Coast with its' mountainous regions uses a lot of mobile work and vertical repeaters on 434 Mhz. The metropolitan Chicago area has a different problem in that a weak repeater council years ago allowed the 450 Mhz. FM repeaters to populate with inputs near the top of the band and outputs on the bottom of the band. There are even repeaters and links on 439 and 440-442 Mhz. in areas where they are not supposed to be. So, if you run 439.25 Mhz. and audio sub-carrier at 443.75-you dump right out on a repeater area. The horizontal mode allows some protection from this type of interference and on-carrier sound is used mostly (better DX range benefits, too). The problem is getting worse and even more confusing as time goes on. I don't think it will ever get organized "together" and can only suggest that you go with what is happening in your own area or the areas you want to try to work. Bring this up at the Peoria conference, that should be good for at least a couple hours of discussion!

"What direction do you see SSTV taking? I am not sure where to put my hard earned dollars in this tight economy. I like the idea of color but know that computers are the way to go for the future. What say A5?" -B. Sanders Philadelphia, Pennsylvania (Editor) SSTV is in a state of real confusion right now. No one is setting standards for Color SSTV, thus several different methods are currently being used. High Resolution Black/White seems to be gaining support by many. Together with crummy band conditions, SSTV is at a period of limbo and only the next few years will determine what is the real future. It's an exciting time watching the developments. My advice? Buy what you can afford-be it a TRS80C, Robot 400 or Microcraft 1000. The important thing is to get on the air, as it offers hours of rewards!

"I just finished reading Henry Ruh's article in the July issue of A5 on an AMSAT for ATV use. I totally agree with this idea whose time has come. Comments; why settle for 2 Mhz. bandwidth? This seems far below current technology. More uplink/downlink channels would be beneficial also. If Henry's proposals are all that we can get, then by all means proceed. How about a followup article?" -Steve Silsby WA4BRL

"Keep up the great monthly issues of A5! My compliments to WA6RDA on the interesting TVRO series. I am not interested in building up that type of system, but have profited by learning so much about Microwave communications." -S. Silsby, Williamsburg, Virginia



**NEW!**

from Science Workshop



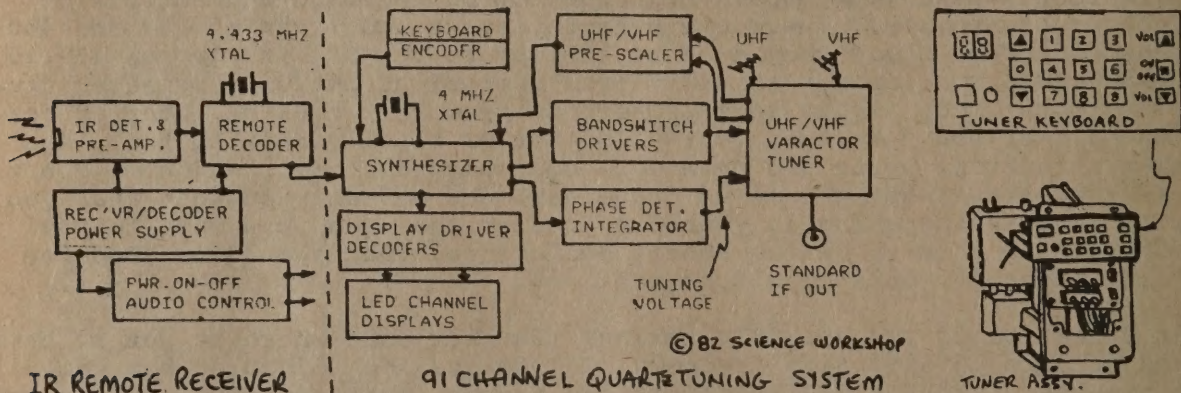
# 91 Channel QUARTZ TV Tuning System!

NEW (SURPLUS) WITH THE MOST RECENT ADVANCES IN DIGITAL ELECTRONIC MICRO-CIRCUITRY. TUNES ALL UHF/VHF AND MID-BAND CABLE CHANNELS WITH QUARTZ XTAL ACCURACY AND STABILITY. NO FINE TUNING- NO DRIFT. YOU INPUT DESIRED CHANNEL THRU 10 DIGIT KEYBOARD- TUNER INSTANTLY LOCKS ON AND DISPLAYS THE SELECTED CHANNEL ON 2 DIGIT READ-OUT. KEYBOARD ALSO HAS UP/DOWN SEQUENTIAL CHANNEL SCANNING KEYS- POWER ON/OFF KEY (ACTIVATES A RELAY TO TURN TV ON/OFF) AND VOLUME UP/DOWN KEYS TO CONTROL AUDIO. ASSEMBLY SIZE APPROX. 10"X6"X9".

COMPLETE INFRA-RED REMOTE CONTROL RECEIVER/DECODER. CONTAINS LOGIC AND DECODING CIRCUITRY TO ACTIVATE ALL OF THE FUNCTIONS OF THE TUNER KEYBOARD. (SCHEMATIC SUPPLIED FOR HAND-HELD IR TRANSMITTER). TRANSMITTERS ARE AVAILABLE FROM THE MANUFACTURER.

REPLACE YOUR OLD, TIRED MECHANICAL TUNER, OR BUILD A REMOTE "CABLE READY" CONTROL BOX. MOST ACCURATE TUNING SYSTEM EVER DEVELOPED FOR TV. BUILD A "COMPONENT" TV SYSTEM AT A FRACTION OF THE COST.

ADD OUR NEW VIDEO AND SOUND IF BOARD (USING "STATE-OF-THE-ART" SURFACE ACOUSTIC WAVE FILTER) TO PROVIDE BASE-BAND VIDEO AND AUDIO, AND YOU HAVE ALL OF THE ELECTRONICS TO HOOK-UP TO ONE OF THE NEW HI-DEFINITION COLOR MONITORS. ADD ONE OF OUR RCA XTAL CONTROLLED RF MODULATORS FOR CHANNEL 3 OR 4 OUTPUT. FOR DECODING, THE VIDEO SIGNAL CAN BE PROCESSED AT BASE-BAND AND THE AUDIO AND CORRECTED VIDEO CAN BE FED TO YOUR TV. NOW AUDIO COMES OUT OF THE TV SET'S SPEAKER, RATHER THAN OUT OF THE DECODER BOX. THESE LATE MODEL WIRED & TESTED TV ASSEMBLIES MAKE EXPERIMENTING A BREEZE!



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THE COMPLETE TUNER ASSEMBLY CONTAINS 5 MAJOR SUB-ASSEMBLIES:

- (1) UHF/VHF VARACTOR TUNER
- (2) UHF/VHF PRE-SCALER
- (3) QUARTZ SYNTHESIZER
- (4) KEYBOARD W/LED DISPLAYS, I-R DETECTOR & PRE-AMP, PLUS AMBIENT LIGHT SENSOR.
- (5) REMOTE I-R RECEIVER/DECODER.

THE SYNTHESIZER ACCEPTS CHANNEL SELECTION LOGIC INPUTS FROM EITHER THE KEYBOARD OR THE REMOTE CONTROL RECEIVER. THE SYNTHESIZER IC IS AN LSI CHIP WHOSE COMPLEXITY AND TECHNOLOGY APPROACHES THAT OF A MICROPROCESSOR. IT DIFFERS ONLY IN THAT IT IS NOT A GENERAL PURPOSE, PROGRAMMABLE MICROPROCESSOR, BUT RATHER IS "DEDICATED" TO PERFORMING SPECIFIC ACTIONS IN RESPONSE TO SPECIFIC INPUT COMMANDS.

BEST PART OF ALL, LOOK AT THESE PRICES:

**91 CHANNEL QUARTZ TV TUNING SYSTEM ..... ONLY \$24.95 !**

ADDITIONAL ASSEMBLIES MENTIONED ABOVE:

COLOR TV	MAIN CIRCUIT BOARD	WITH SAW FILTER
RCA XTAL CONTROLLED	CHAN. 3/4	RF
MODULATOR.....	\$24.95	

SUPPLIED WITH SCHEMATICS AND/OR HOOK-UP INFO. PLEASE ADD \$1.50 FOR UPS.

HOTTEST UNIT WE'VE COME ACROSS IN YEARS!

**RUSH YOUR ORDER TO: Science Workshop Box 393 Bethpage, N.Y. 11714**

**NOTE: FOR FASTER SERVICE, MARK ENVELOPE "QUARTZ TUNER ORDER".**

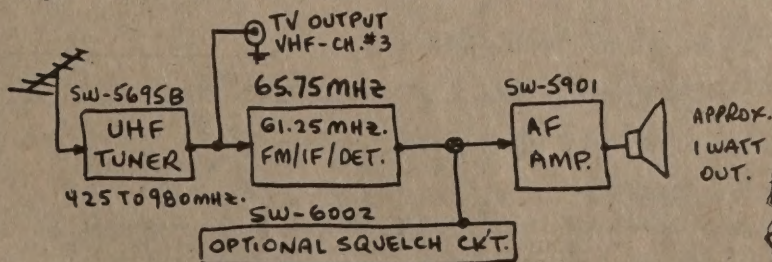


## RECEIVING ATV SOUND FROM THE VIDEO CARRIER NEW SCIENCE WORKSHOP CONVERTER TESTED

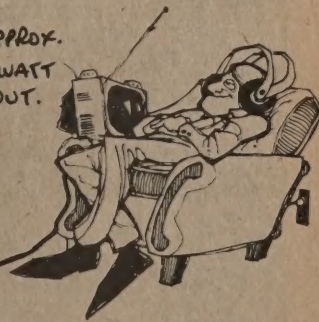
There has always been controversy about which is the best way to send sound on TV, audio sub-carrier being the most popular & on-carrier sound for avid DX hounds. The latter method has always been troublesome in that a second "receiver" had to be used which meant usually another system to keep operating. Many of the most popular brands

of commercial ATV transceivers offer as standard or option both ways of sound modulation on the transmitter. Now, a new "on-carrier" receiver has been developed out of low-cost surplus components by Science Workshop. This little jewel was on display at Dayton and sold out immediately! It comprises of a 61 Mhz. FM/IF detector and audio amplifier (an external speaker must be connected-16 ohms) that literally "attaches" in parallel at the TV sets' VHF antenna terminals with your present ATV downconverter. As you normally tune across the 420-450 Mhz. TV band looking for "video" signals, the receiver picks up any FM carrier modulation as well (even SSB can be detected). The nifty thing about this receiver is that it uses your present low-loss cable run, preamps and high-gain antenna system that you have built up for ATV! No need for switching in and out of line!

An optional squelch circuit is also available (recommended) as is a FM audio sub-carrier circuit crystal and a 425-980 Mhz. tuner board. The system comes one of several ways to fit your budget; kit form-assembled but no case or power supply, kit & cabinet hardware (you put together) or ready to go assembled form with cabinet, all control parts, led and power supply. My first test on this "receiver" was with a station in Chicago about 180 miles away. No video "sync-bars" were detectable on my TV receiver during the test period, but his beautiful full-quieting audio was right in my room...unbelievable! It's opened a whole new area for me on ATV DX'ing. Further tests revealed detection of the video carrier sound long before the video sync-bars appear on the screen. It is also a very accurate way to align the beam headings as well. With the encroaching of nearby FM repeaters and AMSAT users, "on-carrier" just might be the direction of the future for ATV communications.



**SCIENCE WORKSHOP**  
Box 393, Bethpage, N. Y. 11714



-QCD



**MIDWEST AMATEUR RADIO "TELEVISION" CONFERENCE ON FOR SEPTEMBER 17TH  
COMBINED WITH PEORIA, ILLINOIS SUPERFEST FOR EXCITING WEEKEND!**

If you and your family can manage a free weekend this fall, you are guaranteed to have a great time at the 3rd annual Midwest ATV Conference/Peoria, Illinois Superfest! Some very interesting speakers are lined up during the all day Friday session with a wonderful "full course" dinner banquet/guest speaker and even an evening session. The conference will cover everything from ATV basics to 1296 Mhz. TV. This years' get together is being held at the Holiday Inn just off I-74, Peoria, Ill. It is a "Holidome" featuring swimming, saunas, hot tubs, games and other relaxing recreational activities. Sponsored by A5 Magazine, special room rates have been obtained for lodgers if reservations are made through K9ILA Pat Pratt. Transportation has been arranged for XYL's and the kids to Woodfield Mall for shopping at noon on Friday and again on Sunday. An open bar from 10 pm. till ? will be available at the close of the 12 hour meeting. ATV'ers are asked to bring pictures and displays of local FSTV activity, videotapes and any homebrew projects relating to ATV operation. Prizes will be awarded for the best homebrew projects. An antenna measurement session will be conducted Friday afternoon by Henry Ruh KB9FO assisted by NØRS. Now's the time to bring that ATV antenna to see just what kind of gain it really has! As if 12 hours might not be enough, further ATV meetings and forums will be held during the Saturday and Sunday hamfest at Exposition Gardens. A special "Movies Under the Stars" will begin at 7 pm. on Saturday night (outdoors) till the wee hours of the morning. Last year saw Smokey and the Bandit II, Kramer vs. Kramer and Coal Miners Daughter! This will be the only official get-together by multi-state FSTV operators in 1982. Many ideas will be exchanged and it is a great place to meet those DX'ers you have been working all year. Fill out the registration form and return to K9ILA right now!

# **SUPERFEST '82**

## **EXPOSITION GARDENS**

**W. Northmoor Road Peoria, IL**

- **Latest Amateur Radio & Computer Displays**
- **A-5 Magazine's Specialized Communications Forums**  
Color SSTV - MSTV - RTTY - A-5 - TVRO Sattelite TV
- **Huge FREE Flea Market**
- **Free Bus Trip to Northwoods Mall Sunday**

## **FULL CAMPING FACILITIES**

## **SATURDAY NIGHT MOVIES ON THE GROUNDS**

**TALK IN 16 - 76 CALL W9UVI**

## **SAT. NIGHT INFORMAL GET TOGETHER**

**HERITAGE HOUSE SMORGASBORD, 8209 N. MT. HAWLEY RD.**

**ADVANCE TICKETS \$3.00 AT THE GATE \$4.00**

## **FOR MORE INFO AND TICKETS WRITE:**

**SUPERFEST 82, 5808 N. ANDOVER CT., PEORIA, IL 61615**

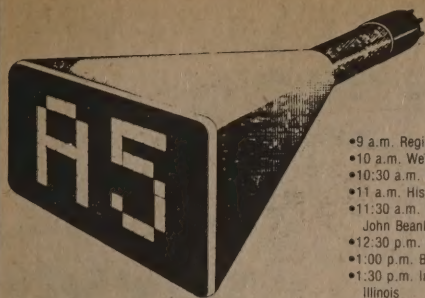
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**SPONSORED BY PEORIA AREA AMATEUR RADIO CLUB**

**PEORIA**

**SEPT. 18 & 19**





**SEND IN YOUR  
REGISTRATION NOW!  
(Special flyer mailing to be  
mailed in July to  
All A5 Midwest  
Magazine Subscribers.)**

# **3RD ANNUAL "MIDWEST STATES" UHF-ATV CONFERENCE** (IN CONJUNCTION WITH PEORIA, ILL. "SUPERFEST" SEPT. 18TH & 19TH) **\*FRIDAY, SEPTEMBER 17, 1982**

- 9 a.m. Registration and Display rooms open
- 10 a.m. Welcome and agenda WBOCQD-A5 Magazine-Iowa (Moderator)
- 10:30 a.m. W6ORG FSTV Videotape presentation-Calif.
- 11 a.m. History of Amateur Television-KB9FO-Indiana
- 11:30 a.m. ATV RF tips (preamps, filters, amplifiers and antennas)  
John Beanland, Spectrum Int.-Mass.
- 12:30 p.m. FSTV DX'ing-WB0JZP Missouri
- 1:00 p.m. Building Projects for ATV-K9KKL Illinois
- 1:30 p.m. Interfacing Computers and other Amateur Modes to ATV-W9RI Illinois
- 2:00 p.m. Open Lunch
- 3:00 p.m. ATV Flybys/Antenna Measuring Contest Mt. Holly  
Airport-KB9FO Indiana-N9CRN Illinois
- 6:00 p.m. ATV Dinner banquet (Guest speaker 7 p.m.) W9NTP Ind.  
Evening Session
- 8:00 p.m. High Resolution SSTV-Dr. George Stever-WB96VI Wisc.
- 8:30 p.m. Using FSTV for Public Service (WX)-W5DFU  
Warren Weldon Oklahoma (also 1296 Mhz. G-line antenna system)
- 9:30 p.m. Nebraska, Minnesota, Iowa, Illinois, Wisconsin, Indiana, Michigan,  
Ohio, Kentucky, Missouri, Oklahoma (Show 'n' tell)ATV State Group Reports
- 10:30 p.m. A5 Magazine Hospitality Suite Open Till?

\*Plus more ATV/SSTV/RTTY  
meetings, displays, etc. including  
"Movies under the stars" At Peoria  
2-day Hamfest! Large flea market  
area!

\$20.00 (per adult) includes conven-  
tion admission banquet dinner,  
hospitality suite (open bar) and  
Peoria Hamfest ticket (\$10.00 XYL's)

\$5.00 Day Session (No Banquet)  
\$5.00 Evening Session  
(Includes Peoria Hamfest Ticket.)

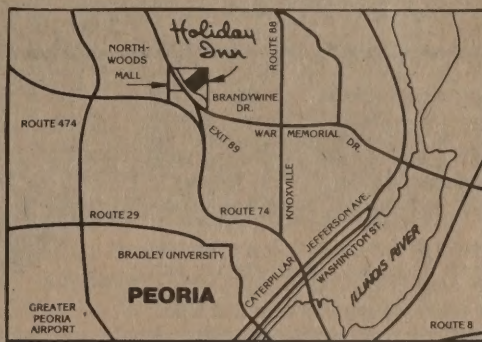


**CONVENTION HEADQUARTERS:**  
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**Special A5 Block Room Rates Available  
FOR ADVANCE REGISTRATION, ROOM RESERVATION AND  
FURTHER INFORMATION, CONTACT:**

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Pekin, IL 61554

(309) 346-1864 or answering service (309) 353-1864



## **1982 "MIDWEST STATES" UHF-ATV CONFERENCE** **Advance Registration Form**

Yes, I plan to attend! Enclosed is \$ \_\_\_\_\_ (\$20.00 per ATV'er) and \$ \_\_\_\_\_ (\$10.00 per XYL and family members) which covers Convention admission, full Dinner Banquet Menu expenses including a Guest Speaker, Conference evening session, A5 Magazine "Hospitality Suite (Open Bar) and two-day pass tickets for the Saturday and Sunday "Peoria Superfest".

**DAYTIME**  
I plan on attending only the evening session. Enclosed is \$ \_\_\_\_\_ (\$5.00 per ATV'er) which covers Conference evening session admission, A5 Magazine Hospitality Suite (Open Bar) and two-day pass ticket to the "Peoria Superfest".

**(Checks payable to A5 Magazine)**

Also enclosed is \$ \_\_\_\_\_ (\$48.00 single/\$54.00 double) for reservations at Conference Head-  
quarters Holiday Inn (Holidome) in Peoria, Illinois per night) Please confirm my guaranteed  
room reservations by return mail.

**(Checks payable to Holiday Inn. Please send sepearte checks-K9ILA)**

Name \_\_\_\_\_ Callsign \_\_\_\_\_ ATV'er? \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_

Zip Code \_\_\_\_\_ Phone Number; Area Code ( ) \_\_\_\_\_ No. attending \_\_\_\_\_

Send to; Conference Coordinator-Pat Pratt K9ILA, 300 Maple Drive, Pekin, Illinois - 61554



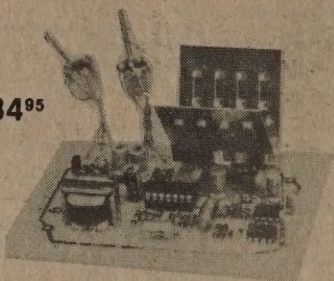
# Turn a few hours work into years of fun with Amateur Television.

## Audio Squelch Control

You have a squelch on your 2 meter equipment; why not add a squelch to your ATV monitor. Now you can avoid the major problem of operating ATV—the annoying hiss and static when the signal is not present. With the ATV squelch, you no longer have to turn the volume down when the signal disappears and risk the chance of missing a signal.

The squelch easily connects to the TV receiver audio stage without modification of the TV, since the squelch circuit contains its own audio output stage. You must provide your own speaker. Operator safety is provided by using transformer isolation between the receiver and the squelch circuit, thus eliminating the shock hazard when using a "hot chassis" type TV receiver.

\$34<sup>95</sup>



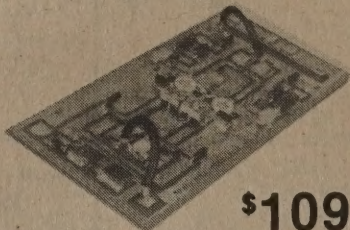
**SIL-K** Complete Kit—includes a detailed instruction manual, printed circuit board and all electrical components. Kit does not include case, speaker and regulated power supply (10 to 15 volts @ 250mA).

**SIL-PCB** Printed circuit board only. \$10.00

**NEW!**

## 100 Watt Linear Amplifier

Now you can get on the air with a high power 100 watt class B linear amplifier for SSB-FM or ATV on the 420 to 450 MHz band and still not spend a lot. This kit is described in Motorola engineering bulletin EB-67 and is available in a number of configurations. For full output, a minimum of 16 watts is required for excitation with an input SWR of not higher than 2:1. Output will maintain stability with a 3:1 collector mismatch at all phase angles. A designed-in low-pass filter suppresses the 2nd harmonic to at least 63 dB down. An external power supply capable of providing 28 VDC, regulated, at 10 amps is also required.



\$109<sup>95</sup>

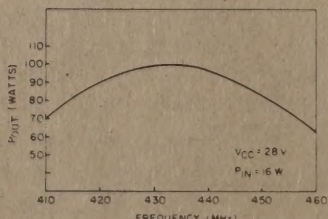
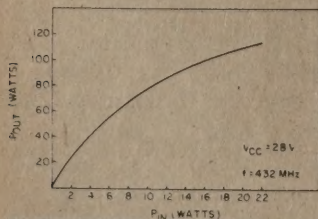
**KEB-67-PK** Kit includes detailed step-by-step instructions, printed circuit board, and all electronic components as shown.

**KEB-67-PCB** Printed circuit board \$14.00

**KEB-67-I** Instruction manual only \$5.00

**TIRED OF BEING TOLD:**  
"Sorry om, I guess the band is just not good enough to see your pictures tonight?"

**This ATV Amplifier Will**  
**Get That Signal Out!**



**"REVIEW" COMING IN NEXT**  
**ISSUE OF A5 MAGAZINE**

## P.C. Boards

The FCC does not allow us to sell Broadband RF amplifier kits in the HF range, therefore we can only offer the printed circuit board and parts on a piece-by-piece basis.

140 watt power amplifier as described in Motorola engineering bulletin EB-63. **EB-63-PCB**

100-180 watt power amplifier as described in Motorola application note, AN-762. **AN-762 PCB**

300 watt power amplifier as described in Motorola engineering bulletin EB-27A. **EB-27A PCB**

Transformers, transistors and other parts are also available.

## We also specialize in hard-to-find components.

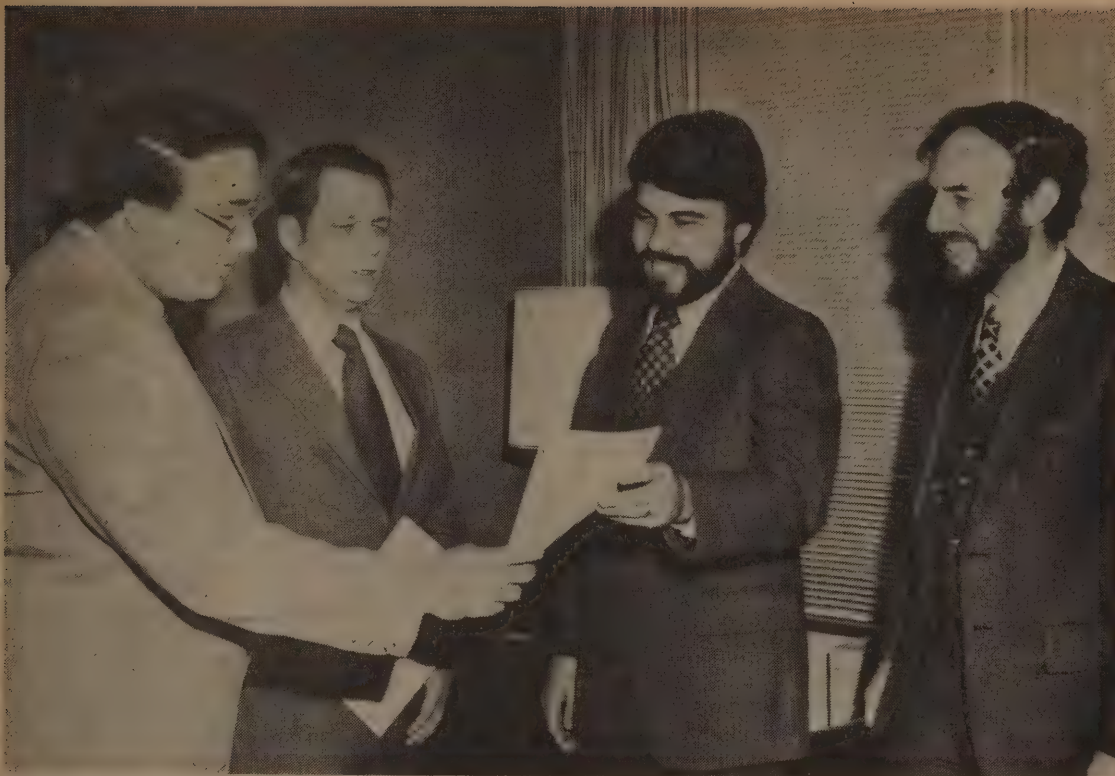
In addition to our kits, we also stock parts for other Motorola application notes and engineering bulletins. We have an in depth stock of Motorola VHF and UHF transistors. Underwood metal clad mica capacitors (Unelco). Kemet chip capacitors. Cambion RF chokes and Ferroxcube Ferrite beads and RF chokes plus other difficult to find parts. If you are having trouble finding a part, call us, we probably have it in stock.

**"WE SUPPORT AMATEUR TELEVISION AND A5 MAGAZINE"**

# Communication Concepts Inc.

2648 North Aragon Ave. • Dayton, Ohio 45420 • (513) 296-1411





The Federal Communications Commission Private Radio Bureau Chief, Carlos Roberts (2nd from right), presents a Special Temporary Authority to the experimentation of Spread Spectrum Amateur transmissions, to Hal L. Feinstein WB3KDU (far left), and Paul Rinaldo W4RI of AMRAD. Dr. Michael Marcus (far right) Chief, Technical Planning Staff of the Commission's offices of Science and Technology, witnesses the ceremonial occasion in March of 1981. W4RI has asked A5 Magazine to question its' readers if anyone has done any work involving the "handicapped" with ATV? A lot of work by AMRAD members is currently being done by RITTY for Handicap persons and FSTV with sign language communication would be an interesting idea for public service. Are there any sign language training films available that could be used on FSTV? If interested, or if you have any information on this subject, please write Paul Rinaldo W4RI c/o AMRAD, 1524 Springvale Avenue, McLean. Virginia 22101.

\*\*\*\*\*

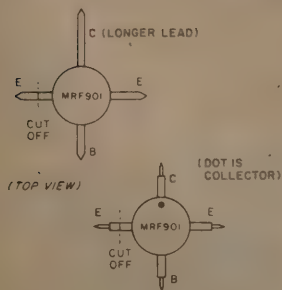
## CORRECTIONS

Our July issue carried VE3CYC's ATV Downconverter article. Listed here is a correction to the article.

Did any of you build it up?

"Thanks" Tim Daniel N8RK of 73!

Fig. 1. Pinout diagram for "Amateur Television's Strip- per."



"Amateur Television's Strip- per" (March, 1982) uses an MRF901 transistor. Several varieties are available, and the accompanying pinout diagram (Fig.1) may be helpful to readers attempting to duplicate this project.

Tim Daniel N8RK  
73 Magazine Staff



## EASTERN VHF/UHF CONFERENCE

The eighth Eastern VHF/UHF Conference was held on May 26 in Boxboro, Massachusetts. Here are the results of the Noise-Figure and Antenna-Gain Measuring Sessions.

Conducted By Bob Atkins,\* KA1GT  
\*103 Division Ave., Millington, NJ 07946

OST

### Preamplifiers and Converter Noise Figures

1296 MHz (3.0 dB second-stage noise figure for PA)

K2UYH	Dexel 1503 PA	0.8 dB
W1JR	Avantek AT8110 PA	0.8 dB
VE3CRU	MGF 1200 GaAs FET PA	1.0 dB
K2UYH	HP 2201 PA	1.3 dB
AFIT	NE21889 GaAs FET PA	1.5 dB
WA2GFP	MGF 1200 GaAs FET PA	1.6 dB
W1OOP	64535's with quadrature hybrids PA	2.0 dB
WA2GFP	Bipolar PA	2.1 dB
K2UYH	MGF 1200 GaAs FET PA	2.2 dB
K2UYH	NE700 GaAs FET PA	2.5 dB
VE2SH	Microwave Modules PA	2.8 dB
W1JR	SOTA converter	3.1 dB
AFIT	MRF 901 PA	3.2 dB
VE3CRU	Microwave Modules Converter	3.3 dB
W1UHE	MGF 1200 GaAs FET PA	3.3 dB
W1XP	MRF 901 PA	3.8 dB
VE2SH	Microwave Modules converter with Microwave Modules PA	4.2 dB
VE2SH	Microwave Modules converter	4.6 dB
WB1CJT	3SK97 GaAs FET PA	4.9 dB
W1JR	MRF 901 PA at high current	5.0 dB
W1XP	MRF 901 PA	6.3 dB
VE2SH	Microwave Modules converter	11.9 dB

2304 MHz (4.9 dB second-stage noise figure for PA)

W1OOP	64535 two stage PA	2.2 dB
W1GAN	NE70083 GaAs FET PA	1.65 dB
W1GAN	FMT 4005 PA	3.65 dB
W1JR	FMT 4005 Converter	4.9 dB

### Antenna Gain

1296 MHz

G3BVU	4 28-element Spectrum International loop Yagis, stacked 22 in.	21.1 dBi
W1JR	45-element homebrew loop Yagi	20.0 dBi
VE2SH	45-element loop Yagi (VE3CRU)	19.5 dBi
W1OOP	49-in. dish with coffee can feed	19.3 dBi
W1JR	23-element F9FT Yagi	18.6 dBi
WA1VUW	38-element loop Yagi	18.2 dBi
W1FC	24-element loop Yagi	17.9 dBi
W1XP	32-element, extended-expanded collinear, 15 years old	15.6 dBi
N1BWT	Reference horn	11.5 dBi
WA1VUW	W21MU dual-mode feed horn	12.7 dBi
W1JR	Reference horn, 1 to 2.3 GHz	11.9 dBi
WA2GFP	Coffee can feed	10.2 dBi
K3PNL	4-element Yagi	9.9 dBi
N1BWT	13-element, W20QH-type Yagi	8.9 dBi

2304 MHz

W1JR	32-in. dish	23.5 dBi
W1JR	44-element homebrew loop Yagi	21.2 dBi
N1BWT	15-element Yagi	15.5 dBi
W1JR	Reference horn, 1 to 2.3 GHz	14.2 dBi
N1BWT	Reference gain horn	11.5 dBi

\*PA = preamplifier

††Reference standard

"See you at the Peoria Midwest Conference!"

State of the art



by

K.V.G.

### 9 MHz CRYSTAL FILTERS

MODEL	Applica-tion	Band-width	Poles	Price
XF-9A	SSB	2.4 kHz	5	\$50.60
XF-9B	SSB	2.4 kHz	8	68.60
XF-9B-01	LSB	2.4 kHz	8	91.35
XF-9B-02	USB	2.4 kHz	8	119.85
XF-9B-10	SSB	2.4 kHz	10	
XF-9C	AM	3.75 kHz	8	73.70
XF-9D	AM	5.0 kHz	8	73.70
XF-9E	FM	12.0 kHz	8	73.70
XF-9M	CW	500 Hz	4	51.55
XF-9NB	CW	500 Hz	8	91.35
XF-9P	CW	250 Hz	8	124.95
XF910	IF noise	15 kHz	2	16.35

### 1296 MHz EQUIPMENT

Announcing the new 1296 MHz units by Microwave Modules.

Low Noise RECEIVE Converter	MMX 1296-144	\$139.95
Low Noise RECEIVE Preamplifier	MMX 1296	64.95
Low Power LINEAR TRANSVERTER	MMT 1296-144	399.95

Plus all our regular 1296 MHz items, antennas, filters, tripers.

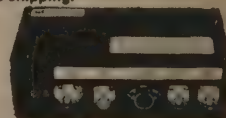
### TRANSVERTERS FOR ATV OSCARS 7, 8 & PHASE 3

Transverters by Microwave Modules and other manufacturers can convert your existing Low Band rig to operate on the VHF & UHF bands. Models also available for 2M to 70cm and for ATV operators from Ch2/Ch3 to 70cm. Each transverter contains both a Tx up-converter and a Rx down-converter. Write for details of the largest selection available.

Prices start at \$189.95 plus \$8.50 shipping.

#### SPECIFICATIONS:

Output Power	10 W
Receiver N.F.	3 dB typ.
Receiver Gain	30 dB typ.
Prime Power	12V DC



Attention owners of the original MM432-28 models: Update your transverter to operate OSCAR 8 & PHASE 3 by adding the 434 to 436 MHz range. Mod kit including full instructions \$26.50 plus \$1.50 shipping, etc.

Write for technical data and price details.

### ANTENNAS

(FOB CONCORD, VIA UPS)

#### 144-148 MHz J-SLOTS

8 over 8 Hor. pol	D8/2M	12.3 dBi	\$68.40
8 by 8 Vert. pol	D8/2M-vert	12.3 dBi	82.90
8 + 8 Twist	8XY/2M	9.5 dBi	71.40

#### 420-450 MHz MULTIBEAMS

48 Element	70/MBM48	15.7 dBi	75.75
88 Element	70/MBM88	18.5 dBi	105.50

#### UHF LOOP YAGIS

1250-1350 MHz 28 loops	1296-LY 20 dBi	49.75
1650-1750 MHz 28 loops	1691-LY 20 dBi	55.95
Order Loop-Yagi connector extra:	Type N SMA	14.95
		6.45

Send 40¢ (2 stamps) for full details of all your VHF & UHF equipment and KVG crystal product requirements.

#### Local Agents:

Florida: Silvernail Electronics, Inc., Largo, FL  
Mid-West: Lee-Tronics, Ltd., Canton, IL  
California: P.C. Electronics, Arcadia, CA  
N.W. & Alaska: Spectrum West, Seattle, WA

(813) 595-3317  
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Concord, MA 01742, U.S.A.

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## Take your favorite H.T. out for a drive tonight.

For \$69.95 you get the most efficient, dependable, fully guaranteed 35W 2 meter amp kit for your handy talkie money can buy.

Now you can save your batteries by operating your H.T. on low power and still get out like a mobile rig. The model 335A produces 35 watts out with an input of 3 watts, and 15 watts out with only 1 watt in. Compatible with IC-2AT, TR-2400, Yaesu, Wilson & Tempo! Other 2 meter models are available with outputs of 25W and 75W, in addition to a 100W amplifier kit for 430MHz.

Communication Concepts Inc. 2648 N. Aragon Ave., Dayton, OH 45420  
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## PORTAPEATER™

\$179.00 assembled unit

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An Instant Repeater

M100 A  
INSTANT REPEATER  
ANY BAND ANY MODE



\$99.00 assembled board

\*Works with any type radios

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\*Built In Test Functions

\*20 Page Technical Manual

(Fully tested, programmed, assembled)

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(201-852-0269)



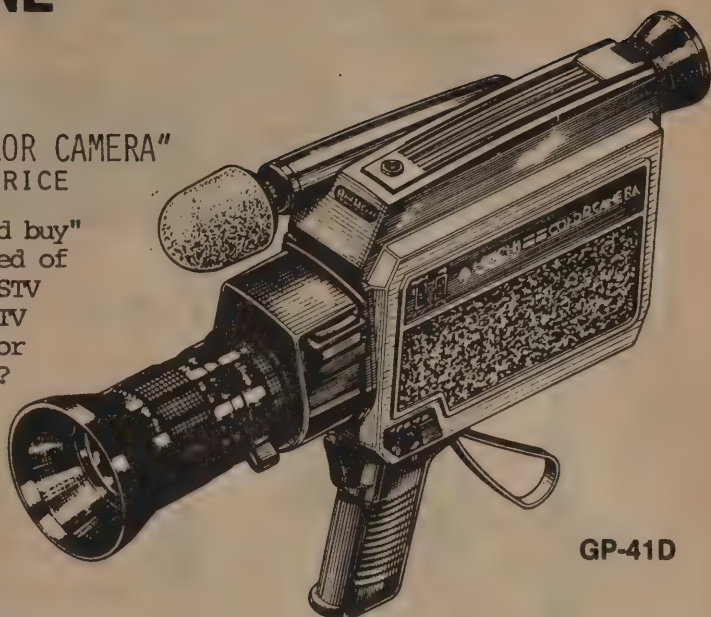
# "A5 MAGAZINE" REPORT

## "HOT BUY ON HITACHI GP-41D COLOR CAMERA" LOTS OF FEATURES AT LOW PRICE

Have you been looking for that "good buy" during a tough economy? Are you tired of sending those old black and white FSTV pictures? Have you upgraded your SSTV converter to multi-memories for color SSTV and looking for a Color Camera?

Well folks, now's the time to take advantage of a manufacturer's closeout while quantities are still on hand! Hitachi's model GP-41D Color Camera has been reduced a whopping \$200 down to a retail of \$490 with features far ahead of any other similarly priced camera on the market-bar none! A motorized,

yes motorized ZOOM 6X1 lense with MACRO-closeup feature assures great pictures both far and near! While most cameras on the airwaves are of 1/2 inch vidicons, this unit is a 2/3" color trielectrode tube with internal sync with 1 vp-p 75 ohm output. The very sensitive illumination requirement is a minimum of 75 lux (fl.6) with a recommended 500 lux or more (fl.6). A special sensitivity switch aids dark area situations. An extendable boom mike on the front and built-in mike on the rear of the camera allows both excellent front and operator interviews or operations. The electronic viewfinder (1.5 inch picture tube) is great for seeing what you are filming and for VCR playbacks. The Hitachi GP-41D needs 12vdc to power the camera with only 6.7 watts of draw. Special LED indicators in the electronic viewfinder tell the operator when batterys are low, when recording and not recording, low light present, white balance indicator and when the power save mode is in effect. Built-in automatic iris, ASC and AGC make hands free setting for the camera operator (especially great for air-mobile ATV work!). The pistol grip handle unscrews for tripod mounting with standard C-mount attachment. The colors look true and natural and not faded out as in cheaper models. Even in low room light, as in an unlit ATV shack, color is surprisingly good. Weight is only 1.9 kg. with all accessories and including the cable. A 110vac/12dc camera adapter is also available at the \$490 price. This is undoubtably the best buy on a color camera in a long time!



GP-41D

Hitachi GP-41D Color Cameras available on Limited Basis

PC Electronics (W6ORG) of Arcadia, California has a few of these terrific buys left. We ordered one from Tom in July and are quite satisfied with ours. I thought I would have had to pay well over \$900 for something of this quality and features. Thanks Tom, for keeping on top of this and making it available to ATV'ers! WB/QCD

### HITACHI GP-41D TRI-ELECTRODE

### PORTABLE COLOR CAMERA.....\$490ppd

6:1 power zoom 14-84mm, auto iris, F1.6 lens with macro focus for close-ups. 1.5" electronic viewfinder. Boom microphone. Full range variable color temperature control. Superior color and low light sensitivity to 75 lux. 12vdc (6.7 watt load) to 117vac adaptor, AP-4 ..... NC

(check on availability)

P.C. ELECTRONICS  
2522 PAXSON LANE • ARCADIA, CA  
(213) 447-4565



# FAST SCAN ATV

**\$399** Delivered

## ALL YOU NEED IN ONE BOX



**TC-1**

Connect to the ant. terminals of any TV set, add a good 450 antenna, a camera, and you are there . . . Show the shack, home movies, computer games, etc.

### FEATURES

- 10 WATT PEP OUTPUT ON SYNC. DC RESTORED MODULATOR. ADJUSTABLE SYNC. EXPANDER.
- STANDARD FREQ. AVAILABLE: 439.25, 434.0, AND 426.25 MHZ SPECIFY XMTR FREQ. AND DOWN-CONVERTER OUTPUT ON CHANNEL 2, 3, OR 4.
- BROADCAST STANDARD 4.5 MHZ SUBCARRIER SOUND WITH HIGHGAIN MIC AMP.
- 8 MHZ BANDWIDTH MODULATOR FOR HIGH RESOLUTION VIDEO, COLOR, AND COMPUTER ALPHA-NUMERICS.
- BUILT-IN REGULATED AC POWER SUPPLY.
- TUNEABLE DOWNCONVERTER COVERS 420 to 450 MHZ. CONTAINS LOW NOISE .9db NE64535 PREAMP, PLUS HOT CARRIER DOUBLE BALANCED MIXER.
- STILL \$399 DELIVERED USA VIA UPS. TWO FOR \$750, OR 5 OR MORE 10% OFF.
- SMALL 10.5x3x9 CONTINUOUS DUTY

### OPTIONS

- DM-1 RF/VIDEO DETECTOR MONITOR INSTALLED WITH BNC OUTPUT . . . . . \$30
- TWO FREQUENCY EXCITER INSTALLED WITH XTALS ON 439.25, 434.0, OR 426.25. NOT AVAILABLE WITH CA-1 . . . . . \$30
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- SET UP TO DRIVE MIRAGE D1010 AMP WITH SYNC STRETCHER IN TXA5 ADJUSTED FOR 90 WATTS PEP . . . . . \$20
- PROVISION FOR EXTERNAL 12 TO 14 VDC FOR MOBILE OR PORTABLE . . . . . \$30
- ON CARRIER AUDIO MODULE CA-1 INSTALLED FOR THOSE AREAS THAT DO NOT USE STANDARD SUBCARRIER OR TWO-METERS FOR AUDIO . . . \$50

★ IF YOU WISH TO BUILD YOUR OWN SYSTEM, SEE THE BASIC 4 MODULE PACKAGE.

Our terms are Visa or Master Charge \$25 min. by phone or mail, or check or money order \$5 min. by mail. We do not believe in surcharging hams the cost of unnecessary paperwork from purchase orders, CODs and their returns from unhappy housewives, or unpaid invoices, or dealer markups. We try to give you the lowest price possible to promote Fast Scan ATV.

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TOM W6ORG  
MARYANN WB6YSS  
213/ 447-4565



# P.C. ELECTRONICS

JUNE 82 CATALOG OF PC BOARDS AND MODULES FOR YOUR COMMUNICATIONS SYSTEM

## Solid State Fast Scan ATV Modules

CALL OR WRITE FOR LATEST CATALOG AND PRICES!

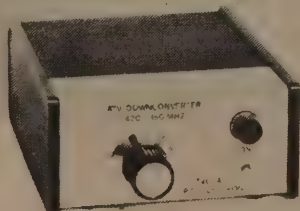
### The Basic Four Modules



"New heavier heat sink!"



(Improved version from TVC-1 in Ch. 14 of ARRL Handbook)



#### 1. TXA5-4 ATV EXCITER/MODULATOR ..... \$89 ppd

This wired and tested module is designed to drive the Motorola MHW-710 module in the PA5 10 watt linear amp. The crystal in the 100 mHz region keeps harmonics out of two meters for talk back. The video modulator is full 8 mHz for computer graphics and color. Requires 13.8 vdc reg @ 70 ma. Tuned with xtal on 439.25, 434.0, or 426.25 mHz. Built in sync expander.

Two Frequency Exciter ..... \$115 ppd  
Set-up with D1010-N 90W amp ..... add \$20 ppd

#### 2. PA5 10 WATT ATV POWER MODULE ..... \$89 ppd

The PA5 will put out 10 watts RMS power on the sync tips when driven with 80 mw by the TXA5 exciter. 50 ohms in and out, plus bandwidth for the whole band with good linearity for color and sound. Requires 13.8 vdc regulated @ 3 amps. MHW-710-2 ..... \$60 ppd

#### 3. FMA5 AUDIO SUBCARRIER GENERATOR ..... \$29 ppd

Puts audio on with your camera video just as broadcast TV does at 4.5 mHz. Puts out up to 1 v p-p to drive the TXA5 or VM-2, 3, or 4 modulators. Requires low Z mic (150 to 600 ohms), and +12 to 18 vdc @ 25 ma. Works with any xmtr with 5 mHz video bandwidth.

#### 4. TVC-2 ATV DOWNCONVERTER ..... \$55 ppd

Stripline MRF901 (1.7 db NF) preamp and double balanced mixer module digs out the weak ones but resists intermods and overload. Connects between uhf antenna and TV set tuned to channel 2 or 3. Varicap tunes 420 to 450 mHz. Requires +12 to 18 vdc @ 20 ma.

Super sensitive TVC-2L with NE64535 preamp (.9db NF) stage ... \$69 ppd

#### TVC-4 ATV DOWNCONVERTER ..... \$89 ppd

This is a packaged version of the TVC-2 converter with internal power supply. Has BNC input and F output connectors.

Also available with the NE64535 (TVC-4L) ..... \$105 ppd  
Size: 5 1/4 X 2 1/2 X 7 inches.

### ..... Package Specials .....

TXA5, PA5, FMA5, and TVC basic module package ..... \$249 ppd

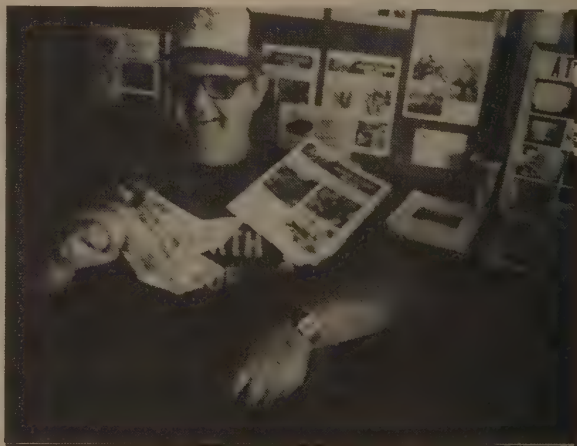
OPTIONS: 2 frequency exciter ..... add \$26  
NE64535 low noise downconverter ..... add \$15  
Packaged TVC-4 downconverter ..... add \$34  
Magnacraft W120X-14 coax relay ..... add \$41

Clubs & Groups...10% discount on 5 or more of one module ordered at one time to one address.



## "A5 MAGAZINE TRAVELS AND ATTENDS SEVERAL MIDWESTERN HAMFESTS" HOPES TO EXPAND TO EAST/WEST COAST NEXT SEASON

One of the great things about summer, is "hamfests"! A5 MAGAZINE has been covering quite a few "midwest" get-togethers since the first of the year, and hopefully will be able to attend some of the east and western coast hamfests in 1983. Our circuit began in January at Wheaton, Illinois (Chicago area) where a mixup got us out in the "flea market" area instead of in where the commercial booths were. Nevertheless, Red Wilson and I did indeed meet a few of the Chicago group ATV'ers with a very enjoyable evening before visit with ATV DX'er W9ZIH. Davenport, Iowa's February hamfest got moved into March a bit and over 30 FSTV operators from two-states got together in the afternoon for a group meeting and photos. The photographers photos never came out at all so all of history was lost. The March Sterling, Illinois hamfest showed better weather but only a few ATV'ers stopped at the "booth". Traditionally known as a small hamfest, we do not plan on attending it next year. The big get-together of course was Dayton in late April. Over 20,000 attended this year and ATV was there in all modes and style! (Complete report in our June and July issues). We had planned on attending the Louisville, Kentucky and Knoxville, Tennessee hamfests (Worlds' Fair), but ran out of funds. ATV was represented however, by local ATV'ers at special forums. The Princeton, Illinois hamfest in June is always a good one, with alot of FSTV operators hanging around the south end of the 4H grounds. Movies were shown Saturday evening with the only spoiler being a drunk from Peoria who didn't know where the outhouse was. June 10th at Oak Creek, Wisconsin (just outside of Milwaukee) brought quite a few ATV'ers out, especially the Chicago MATS group-jackets and all. The afternoon "rainout" got us a head start for Indianapolis, Indiana on Sunday. We had a nice booth there set up but met very few Indiana ATV'ers. For such a large "repeater" group on ATV, I thought we would get to meet alot of the fellas. We did see Don Miller and Henry Ruh along with a few of the Bloomington group (BBS'ers) but where were you Indianapolis? The trip would have been a financial disaster if K9KTH hadn't bought a lifetime subscription of A5 MAGAZINE! We have crossed paths with George Steber of Microcraft promoting a new "high-resolution" SSTV converter. His pretty XYL was not there with him at Cedar Rapids, Iowa at the National ARRL Hamvention in July which perhaps explained why attendance seemed low at the affair? The CVARC did an excellent job in 3 years of organizing the events, but talking with many of neighboring "dealers"-it was not financially worth the trip. We ended up in the red by \$57 and did not have that much in operating expenses. Even so, \$100 tables take alot of \$2 magazines to pay for it all. It was great getting to meet David Sumner K1ZZ who was at the top of the scores at a "CW Contest" booth (50 wpm) and Lee Aurick, head of advertising at QST Magazine. Jim Craig Clark of Ham Radio and his beautiful "harem" were grabbing alot of customer attention as was Alan Dorhoffer K2EEK of CQ Magazine fame. We had an interesting (one-way) conversation from Tom Clark, President of AMSAT on how they plan to utilize the UHF spectrum right in ATV territory. Perry Klien, ARRL Rep. in Washington, DC. said hello at the A5 booth. The big disappointment was the last minute pulling out of ROBOT, San Diego, Calif. Nobody seemed to know just why? Tom Hibben KB9MC assisted the booth and along with W9NTP Don Miller, George Steber and John Greve W9RI gave talks to 110 plus attendees at the Saturday ATV forums. At printing we are on our way to Chicago for the Sante Fe hamfest. See you in Sept. at Peoria!



Bob Meyers K9KTH buys A5 lifetime sub.





George Steber, Microcraft, Inc. shows a customer his new line of high resolution SSTV Gear at Indianapolis.



George Steber was a Forumn Speaker at Indianapolis with W9NTP



Two "Pretty Ladies" campaigning for W9NTP Don Miller at Indianapolis.



Communication concepts booth at Indianapolis.



A5 Magazine display at Oakcreek, Wisconsin with Jeff Stone selling subscriptions and back issues.



A5 Magazine booth display at Indianapolis, Indiana. Where were all you Hoosier ATV'ERS?





# SE-1a UHF ATV TRANSCEIVER:

Add a camera, antenna, mic, 13.6vdc and a TV set for a complete fast scan ATV station.

## STANDARD FEATURES

- SA-1 SYNC AMP FOR SOLID STATE LINEAR AMPLIFIER USE.
- 2 RF STAGE DC-1 CONVERTOR WITH LOW NOISE NE64535 FIRST STAGE.
- BOTH FM AND 4.5MHZ SUB-CARRIER AUDIO.
- RECEIVE TUNES FROM 418MHZ THRU 455MHZ – OUTPUTS TO TV CH. 2, 3 or 4.
- STABLE CRYSTAL CONTROLLED TRANSMIT – 439.25 MHZ STANDARD – OTHERS AVAILABLE.
- DURABLE STRIPLINE LINEAR AMP FINAL WITH BANDWIDTH FOR COLOR AND 4.5MHZ SOUND.
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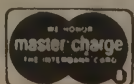


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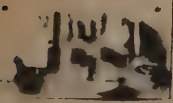
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# ATV KITS AND MODULES



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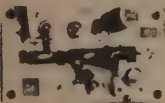
**A-2 4.5MHZ AUDIO SUB-CARRIER** — Accepts audio from VCR or GLB audio processor to provide ATV audio on TV set. Has on-board voltage regulator and shielded inductor. 2 3/4" x 1"; **\$18.95 kit, \$24.95 assembled.**



**SA-1 VIDEO SYNC AMP** — Provides separate video sync gain control for VM-2 above or SE-1a transceiver. Useful when driving solid state amps. 1 3/4" x 1 1/4"; **\$14.95 assembled, \$11.95 kit.**



**DC-1 UHF CONVERTOR** — Varactor tuned with 2 RF stages. MRF901 input standard. Double sided stripline design. Outputs to TV ch. 2, 3 or 4. Can be tower mounted. 11 — 14vdc. 2" x 3". **\$34.95 kit, \$49.95, assembled, \$79.95 complete in box.** Add **\$15.00** for NE64535 1st stage.



**P-1 WIDEBAND LOW NOISE UHF PREAMP** — Uses MRF901 transistor to provide 16db gain and 1.7db noise figure. Covers 420—450MHZ band. Other frequencies received with change in input inductor. 2 1/4" x 1 3/8"; **\$17.95 kit, \$26.95 assembled.** Add **\$15.00** for NE64535 Option.



**LA-1 UHF AMPLIFIER** — Uses 15 watt MRF641 transistor with 7.8db gain @ 470MHZ. Stripline inductors with on-board pin diode antenna switching for a receiver. Designed for wideband color video with exciters such as the GLB T450L that provides up to 3 watts drive. Drilled and tapped heatsink included ( 4 1/2" x 1 3/4" ). 1 to 3 watts drive typically gives 6 to 18 watts output. 12 — 14vdc operation @ 4 amps max. Double-sided board is 4 1/2" x 2". **\$69.95 assembled with test data.**

**LA-45 UHF AMPLIFIER** — Uses MRF646. Input power of 6-15 watts typ. gives 20-50 watts output. Biased for linear operation. Kit includes all parts, instructions and 4.2" x 3" double-sided stripline board. Needs 12-14 vdc @ 9 amps max. **\$59.95 kit.**

**GLB T450L TRANSMITTER** — 4 1/2" x 2" RF board typically supplies 2—3 watts FM output, 1 — 1 1/2 watts average video RF output. Changes for wideband video modulation provided. Comes with crystal for 439.25MHZ, with other frequencies available upon request. Also includes separate 1" x 4" audio processor board which supplies audio for FM modulation or for the A-2 4.5MHZ audio kit above. 12—14vdc @ 2 amps max. **\$54.95 kit, \$74.95 assembled and tuned.**

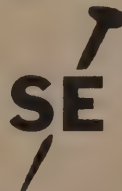
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## "ALL ABOARD TVRO"

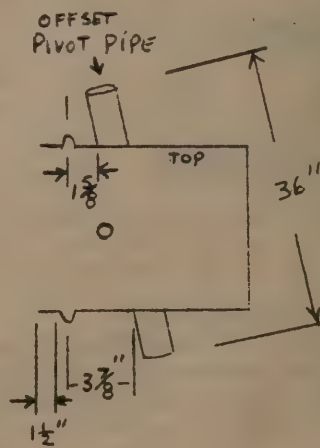
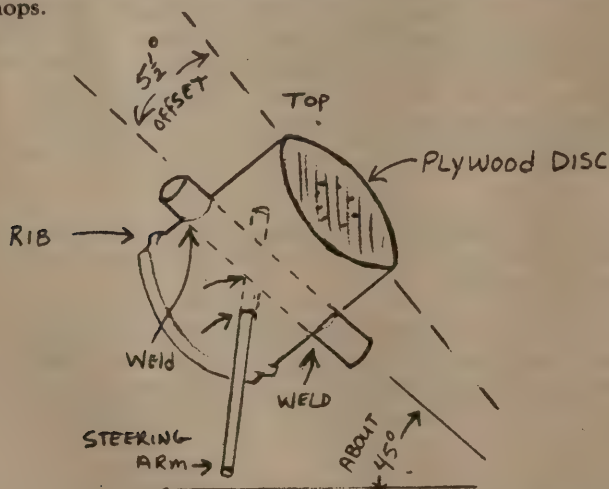
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13' Dish

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With all those new birds being launched every few months, it is important to consider a dish antenna that will "track" through the equator, and be able to see all the satellites, without having to spend hours re-adjusting the mount each time you switch satellites. The dish that is shown here is capable of swinging a true arc, providing it is set up correctly. If you are located about the same distance from the equator as I am (San Francisco), then you will find that  $5\frac{1}{2}$  degrees offset will be correct. If you were on the equator, no offset would be necessary, for your antenna would simply make a straight arc. But as you go north, the satellites appear lower in elevation to each side of true south, thus the dish as to swing a curved arc to track properly. Don't let this confuse you, for the mount is very simple, and easy directions will aid you into correct installation. First lets talk dish. We'll get down to the mount later, and next issue will have a motorized drive attachment that can be build for under \$100 from common materials. Materials: the hub consists of a 55 gallon drum that has been cut just past the first rib. A  $\frac{3}{4}$ " plywood disc is inserted on the face, and is cut to the inner diameter  $22\frac{1}{2}$ ". The ribs are  $1\frac{1}{4}$ " sch 40 PVC pipe, with supports made from  $\frac{1}{2}$ " EMT conduit. The outer ring is  $\frac{1}{2}$ " CPVC pipe ( $\frac{5}{8}$ " O.D.) available from most plumbing shops.



The Drum is cut  $1\frac{1}{2}$ " past the first rib, which allows additional brace strength. I used a cheap sabre saw with a fine blade. The pipe that is welded through the drum has a  $2\frac{1}{2}$ " I.D. (water or fence pipe). This will slip over a  $2\frac{3}{8}$ " pipe used on the mount.

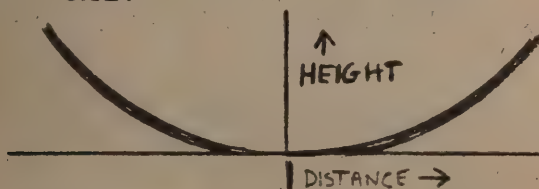
The drums steering arm is a  $1\frac{1}{4}$ " thin-wall tube (fence pipe) that is mounted 90 degrees from the pivot pipe, and is extended on one side only. This extension should be about 5' out of the drum, thus you will need 7' of pipe. The steering arm and pivot pipe cross each other and just touch, where a weld is placed for strength.

The ribs are 20' sections of PVC pipe that is cut into thirds (80") and formed over a jig cut from one inch plywood. An old 19" rack is the furnace box, with a space heater to heat things up to 300 degrees until the ribs are pliable. The pipe is pre-heated on top of the tin prior to going into the oven. 3 to 4 ribs at a time is all that can be kept in the oven while in operation. The jog has plumbers tape strapping the ribs taut until cooled with a water hose. This strap is run through the pipe and holds it in place while in the oven, and is removed after the pipes are cooled. The ribs are actually squeezed in the jig to an elliptical shape with a hinged board and C clamps. This gives the pipe additional strength, and also makes a flatter surface for the ring pipe to fit through. A group of us locals got together and formed 200 ribs in one weekend. We decided to use grey  $1\frac{1}{4}$ " PVC conduit, since it is sunlight resistant, where the white PVC pipe should have latex applied to keep ultraviolet from aging it. The jig formula for a 13' dish with F/D .39, and a focal point 60.8" ---all in inches---

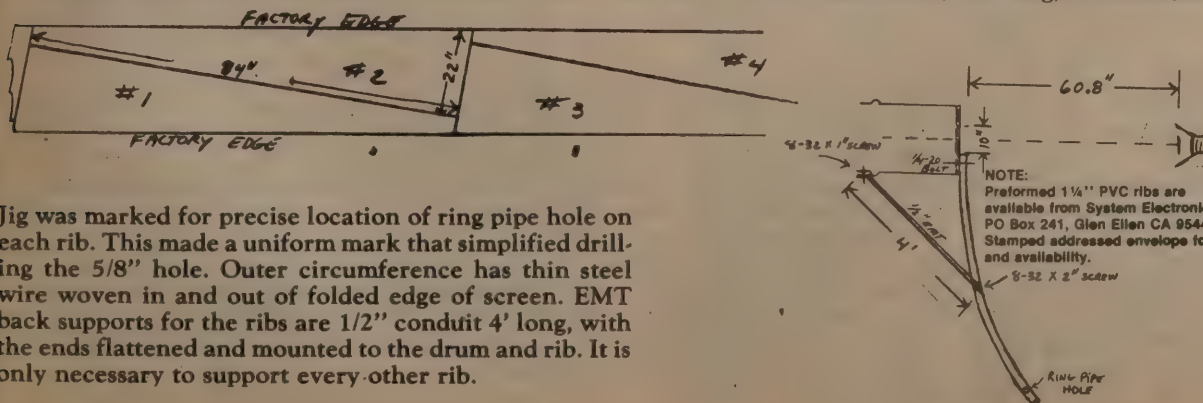


distance	height	distance	height	distance	height
0.0		10.0	.411	20.0	1.644
1.0	.004	11.0	.497	21.0	1.812
2.0	.016	12.0	.592	22.0	1.989
3.0	.037	13.0	.694	23.0	2.174
4.0	.066	14.0	.805	24.0	2.367
5.0	.103	15.0	.925	25.0	3.568
6.0	.148	16.0	1.052	26.0	2.778
7.0	.201	17.0	1.188	27.0	2.996
8.0	.263	18.0	1.331	28.0	3.222
9.0	.333	19.0	1.483	29.0	3.456

distance	height	distance	height	distance	height
30.0	3.698	46.0	8.695	62.0	15.796
31.0	3.949	47.0	9.077	63.0	16.309
32.0	4.208	48.0	9.467	64.0	16.831
33.0	4.475	49.0	9.866	65.0	17.361
34.0	4.750	50.0	10.273	66.0	17.899
35.0	5.034	51.0	10.688	67.0	18.446
36.0	5.325	52.0	11.111	68.0	19.001
37.0	5.625	53.0	11.543	69.0	19.564
38.0	5.934	54.0	11.982	70.0	20.135
39.0	6.250	55.0	12.430	71.0	20.714
40.0	6.575	56.0	12.886	72.0	21.301
41.0	6.907	57.0	13.351	73.0	21.898
42.0	7.249	58.0	13.823	74.0	22.502
43.0	7.598	59.0	14.304	75.0	23.114
44.0	7.955	60.0	14.793	76.0	23.734
45.0	8.321	61.0	15.290	77.0	24.363
				78.0	25.000
				79.0	25.645
				80.0	26.298
				81.0	26.960
				82.0	26.630
				83.0	28.308



Formula is extended beyond actual needs to aid in jig construction. Note that each rib should start 5" from center, so marking the jig with a stop "nail" would be easiest. Nail heads protruded from the jig just enough to make a dimple every six inches on the screen surface. This allowed easy and accurate drilling for securing the screen. Mesh is standard aluminum window screen, overlapping with the "factory" edge being on top to prevent unraveling. I used 1/8" pop-rivets with No. 6 flat washers under the heads, to secure screen, although self-tap screws would also work o.k. A 12" dia. tin or aluminum plate makes the center hub that ties the ribs together. Carefully mark out the hub and use it as a template for the drum. Insert 1/4" bolts through the hub, ribs and drum. 3" to 3 1/2" bolts seem easiest to work with. Window screen is off a 2' wide roll by 90' long, cut as shown.



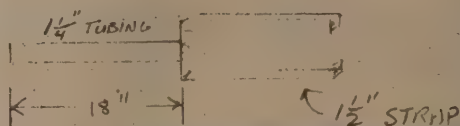
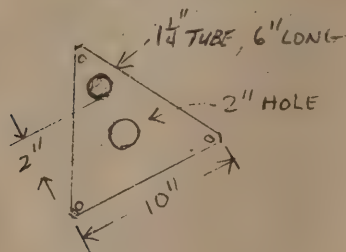
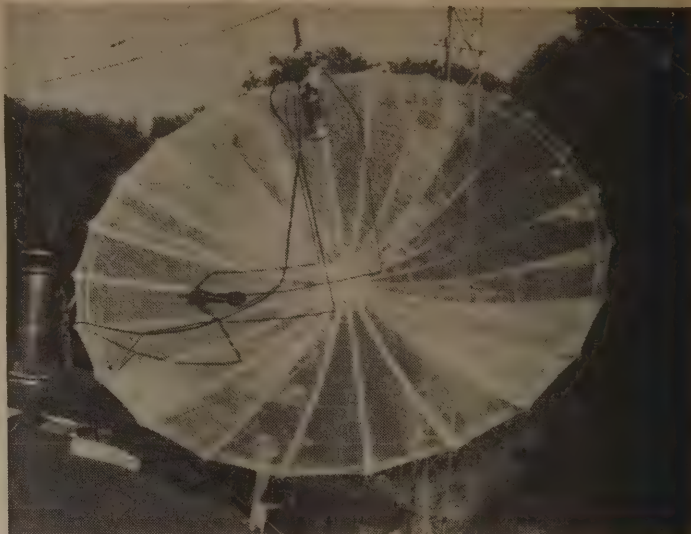
Jig was marked for precise location of ring pipe hole on each rib. This made a uniform mark that simplified drilling the 5/8" hole. Outer circumference has thin steel wire woven in and out of folded edge of screen. EMT back supports for the ribs are 1/2" conduit 4' long, with the ends flattened and mounted to the drum and rib. It is only necessary to support every other rib.



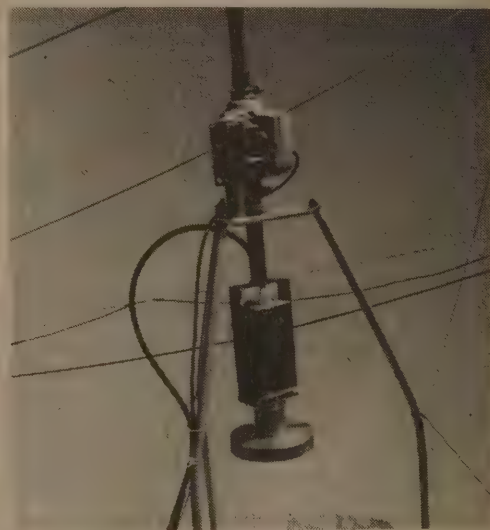
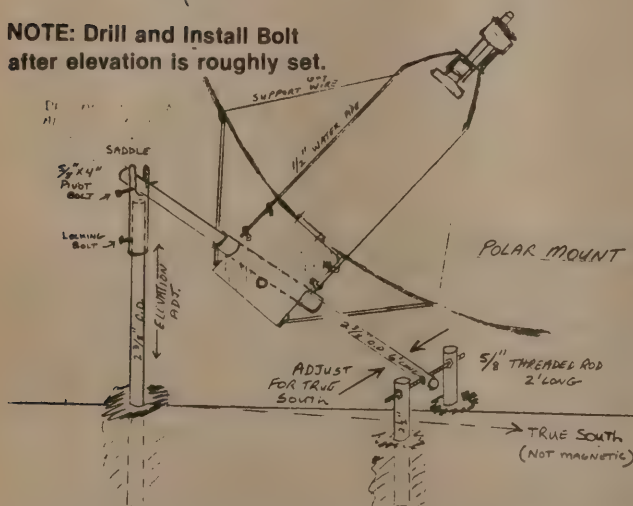
The LNA is supported by a "Milk Stool", which is fabricated from thin wall tubing welded to 1/16" steel. 3/8" bolt stubs are welded inside 1/2" water pipe sections which are bent around the LNA.



"MILK STOOL"



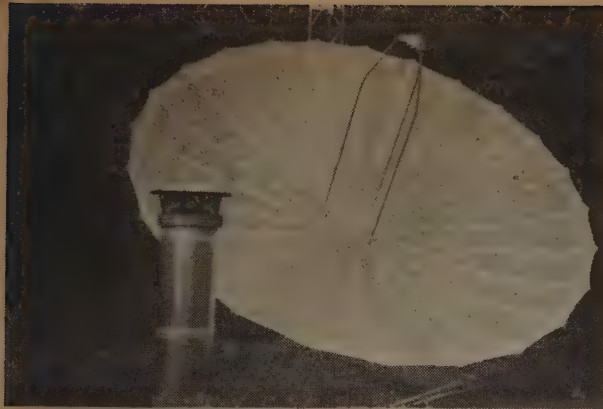
NOTE: Drill and Install Bolt after elevation is roughly set.



Detail, LNA, Rotor Mount

Polar mount consists of 2 1/2" water pipe buried in the ground with cement, for front supports. Locate pipes 2' above the ground and separate 12 to 14" apart. 5/8" threaded rod with locking nuts will allow lateral movement to "fine tune" system to swing through arc. Height of rear support depends on angle or location. Use 2 3/8" O.D. with 2 1/2" I.D. piece 3' long for adjustment. Cut saddle into large pipe and install 5/8" bolt. Trial and error tests by swinging antenna from one end of the system to the other and watching satellites, will enable you to fine tune southern adjustment. Elevation adjustment should be set and forgotten once you have the system set up. The angle for the pivot pipe will depend on your location. (40 degrees for San Francisco), which would make the antenna 5 degrees lower due to the offset. As the antenna is rotated either side of true south, the dish will drop lower to automatically compensate for the difference in elevation angles. Steering arm is not shown, and will be explained in next issue. I might note that I decided to mount the antenna on my roof due to wooded area in which I live. This gives me the clearance I need to get all the birds. Basically I have the same mount, only I use need my tower instead for the rear support. It has survived several wind storms without any problem, and the picture didn't even flinch during this time.

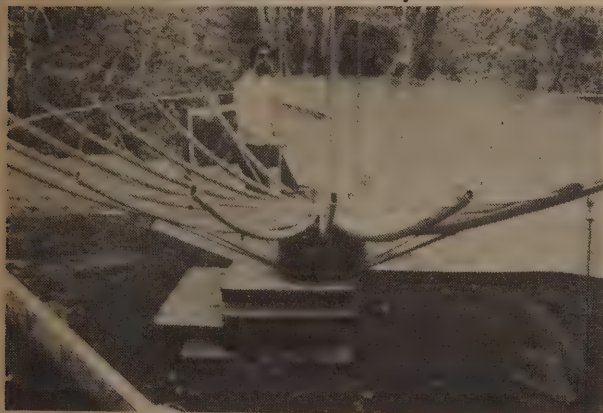




24 Ribs make a sturdy dish



W6KTT and WB6HXW inspect finished ribs.



WA6RDA hard at work.



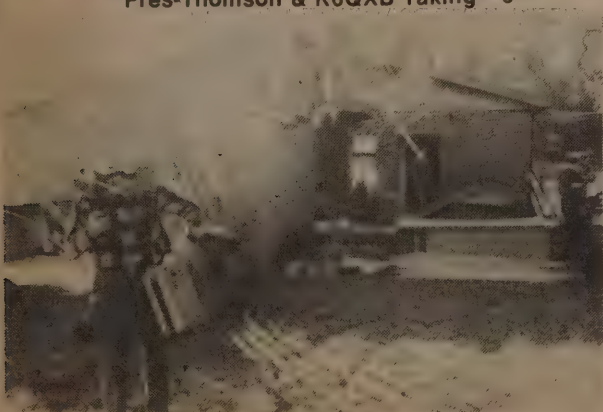
13' dish mounted on roof



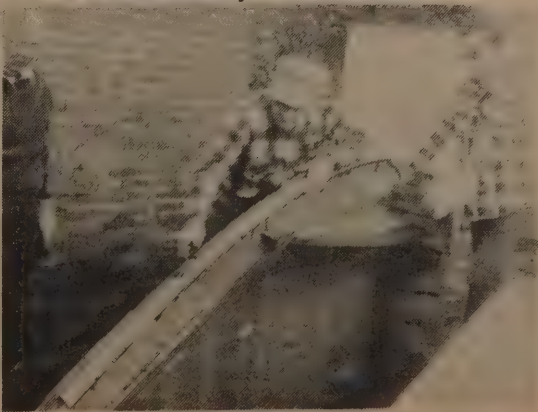
Pres-Thomson & K6QXB Taking "5"



WA6RDA Ready to mount ribs

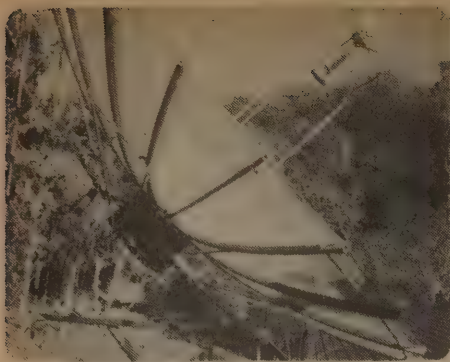


W6JFN shotting video for ATV library

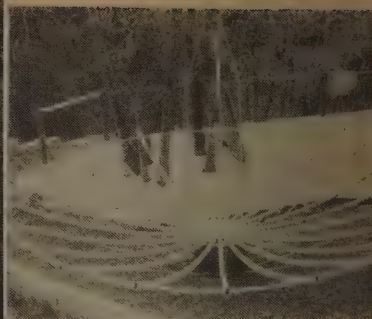
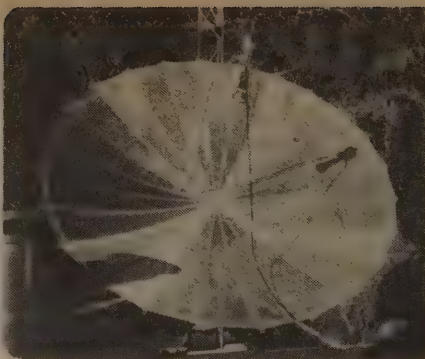


Hard at work cooling ribs is W6JFN





HOMEBREW LNA INSTALLED.

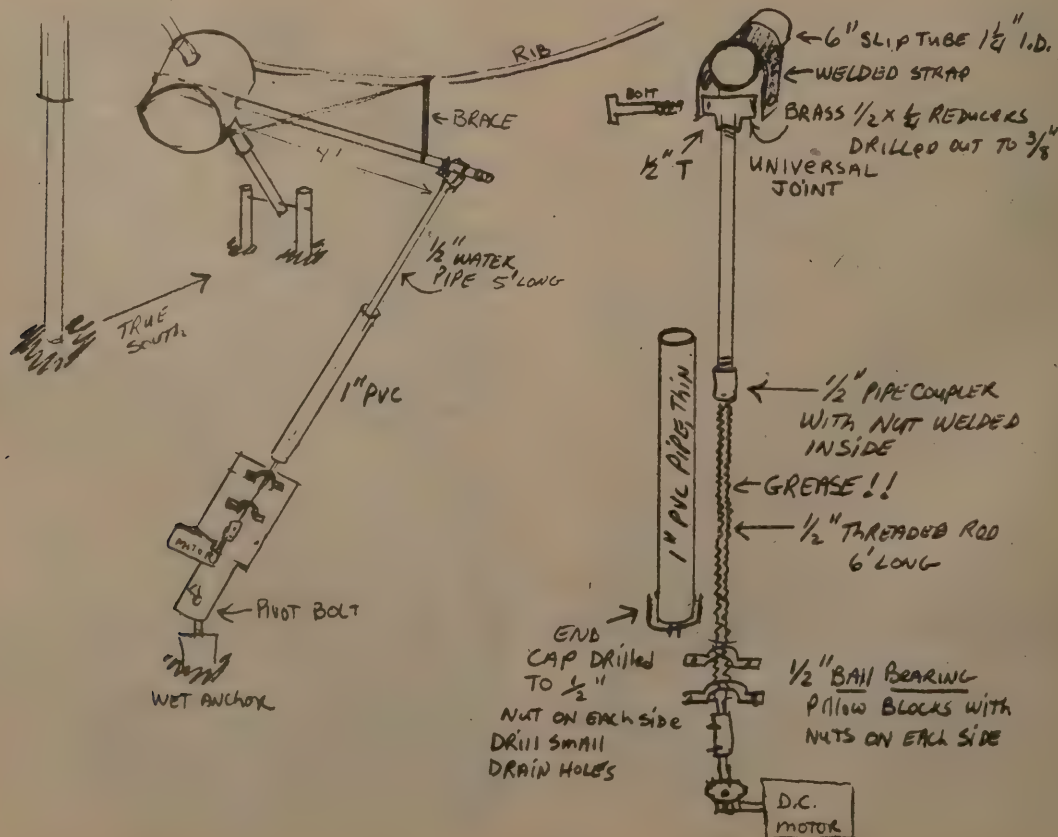


READY TO INSTALL WINDOW SCREEN

### SATELLITE TELEVISION Steering Mechanism for dish

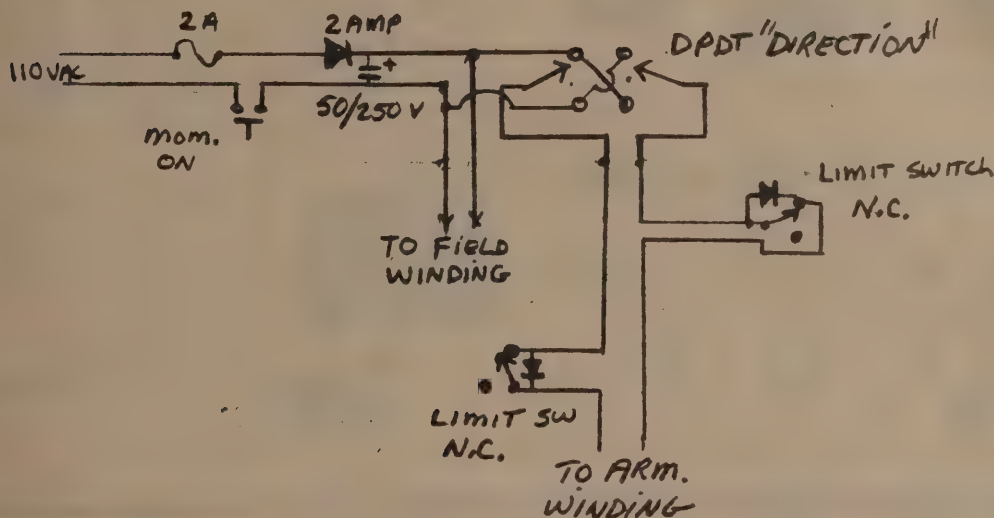
Simple strong and effective is the words used to describe this unit. The heart of the system comes from the hardware store, being a six foot threaded rod  $\frac{1}{2}$ " in diameter. This rod threads into a  $\frac{1}{2}$ " water pipe that is 5' long. The rod is protected from dirt and rust by a 6' length of thin-wall PVC 1" sch. 160 or 200. The motor must be reversible and have a geared output of between 150 to 200 RPM. A DC shunt motor was used with a surplus gearbox running about 180 RPM, taking about 5 minutes to travel from satcom F3 (131 degrees) to satcom 4 (83 degrees). With all satellites having 4-5 degree spacing, I can hop from one to another in about 30 seconds.

CONSTRUCTION: Threaded rod is secured to plate with BALL BEARING pillow blocks and locking nuts. End of rod was ground down to accept a flex coupler  $\frac{3}{8}$ " to couple motor. A universal joint was fabricated from a  $\frac{1}{2}$ " pipe T with brass reducers inserted and drilled out to accept a  $\frac{3}{8}$ " bolt. Motor I used was 115VDC, but I suggest looking into a 12 volt electric window motor and maybe use a relay with small battery and trickle charger. Ham ingenuity will always come up with something.

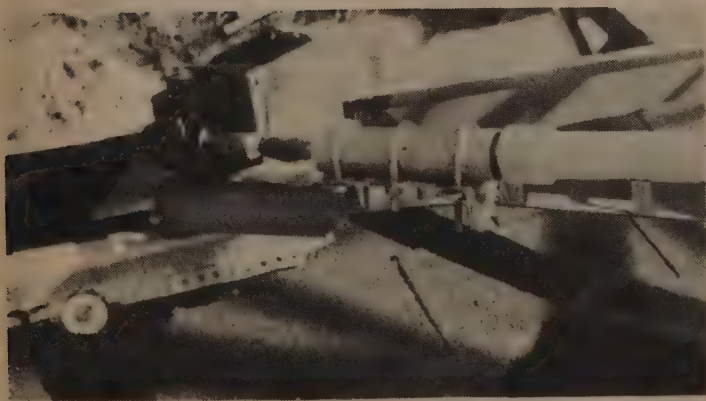




I decided to put limite switches at each end of travel for safety reasons, although I smashed the threads on the rod after threading it through the nut, to keep it from coming all the way undone. The nut that is welded inside the coupler is actually a rod "coupler", that I purchased at the hardware store, which is about 1" long and will wear better than a standard nut. This nut will press fit into a standard 1/2" pipe coupler, then weld for additional strength. Limit switched do not need an "over ride" wire if you insert a diode across the switch. When the switch opens, it throws the diode in series, which will allow reverse direction only, until the arm travels far enough to close the switch again. This arm should swing the antenna approx. 50 degrees over all, with satcom 1 (located 135 degrees west) being in the fully collapsed position. Swinging to the east, dish should travel to 83 degrees west (satcom 4) when fully extended. Torque is very minimal to turn the rod, thus a small motor, depending on RPM and gearing, should easily turn with 1/15 hp. I tried small AC cap start motors, but they just didn't seem to have the starting torque. Last comment, it sure is nice to sit in the arm chair and command that monster at the flick of a button. 73's.



NOTE: A booklet titled "TVRO HANDBOOK" containing over 50 pages of diagrams, artwork layouts and other detailed information is available for \$18 plus postage (\$1 U.S.A.) from System Electronics PO Box 241 Glen Ellen, Calif. 95442. All articles that have appeared by myself in A5 are also included in this booklet.



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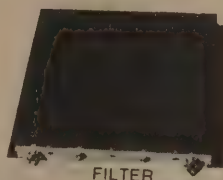
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## A5 TESTS PSF-432 ATV FILTER BY S.I.

Are you plagued by interfering 2 meter signals at your own station wiping out incoming FSTV video? A5 purchased one of the PSF432 filters distributed from Spectrum International and put it in line between the ATV transmitter and a 100 watt linear and could't believe the results! My two-meter array is only 18 inches from quad-stacked 48 J-beams and even with 100 watts-no interference to weak incoming 439 Mhz. TV signals! The filter appears to "clean-up" some jittery problems on output as well. We lost less than 1-watt insertion probably due more to extra jumper cable than the filter itself. How did we ever get along without it? Other filters are also available for different problems.



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## A5 MAGAZINE "REBUTTALS" KB8LU WORLD RADIO NEWS COLUMN GERMAN WRAASE SSTV CONVERTER GETS BAD REVIEW

The Volker Wraase SC-422A 3-Memory SSTV Converter got a bad "review" in the August issue of WORLD RADIO by new column editor Ron Flynn KB8LU. References were constantly made to the popular ROBOT 400 SSTV Converter which made the reader wonder which

unit was really under "review"? This "comparison" method neglected many extra features in the German scanconverter not found in any other present system. Our complete review ran in the Nov/Dec 1980 and March 1980 issues with coverage as far back as our July/Aug 1977 issue - 5 years before the WORLD RADIO coverage! Mr. Flynn must have spent only 5 minutes this year at the KW CONTROL SYSTEMS booth at Dayton, Ohio where the SC422A was on full display? As stated in our Part one Dayton report in the recent June issue, Syd Horne's COLORSCAN 403 and WRAASE's SC-422A SSTV Converters were neck and neck for the "best" displayed COLOR SSTV! A lot of BS was being passed around prior to Dayton on the 14,230 Mhz. SSTV circuit with those who attended Dayton seeing a first hand comparison of competitive systems. OK Ron, yes-it's complicated to work...but if the ROBOT 400 had over 30 functions it would be too! Those multi-functions are what makes the SC-422 converter unique! Comparisons are made between the German unit and the 400 unit on 16 second resolution via an outboard "mod" incorrectly named and being promoted as "256". Contrary to Texas propaganda, ROBOT 400's only display 8 shades of grey levels and 128 pixels across by 128 lines down-no matter what "mods" are installed. The 16 or 25.5 second pictures being called "high resolution" by ROBOT owners is in reality the same 128 X 128 picture at a "slower" clock rate (ROBOT owners read your manuals). The SC422A can display 16 shades of grey and up to 256 pixels per line by 128 lines. Only other SC422 model owners or those with computer based designs such as Robert Suding's, Clay Abrams or the Commsoft line can actually "see" this high resolution being transmitted. In the WORLD-RADIO review, no mention is made to multiple choice line, dot raster or blended monitor displaying, dual-memory picture overlays, automated 2-memory switching transmit capability, colorflash, see-thru memory, 8-level grey scale test indicator, tunable sync control, cassette correction contrast transmit, and many more of those "troublesome" and "confusing" switches. The SC422A is indeed a basic two-memory unit with an expandable 3rd memory added as an option. Only 2 switches are used between the 3 memories which is no harder to catch on to than three. Monitoring of 14,230 Mhz. has seen many "memory" loading or transmitting errors by the 3-memory ROBOT units as well and I think this has to be considered "operator error" not unit review. Oh, Mr. Flynn also forgot to mention in his "review" little things like a full COLOR GRAPHIC KEYBOARD and VIDEO LIGHT PEN which is the only ones available on the market. Sure, the price tag is high-but then so is a Lincoln-Continental or a Cadillac! Our special upcoming November Color A5 SSTV edition has several of the SC-422A color photos & perhaps things will be laid to rest? Is it just possible that something could indeed be better than a USA product? Keep up your fine work on the SSTV column Ron, but please deliver all the facts to your "readers" and not just based on a few minutes at a very crowded booth in Dayton!





# "AN AMATEUR RADIO SSTV COMPUTER INTERFACE WITH ACCESSORY SWITCHING"

BY DAVE SARGENT (DYNAMIC SPECIALTIES) K6KLO

As computers have come down in cost their popularity in amateur radio applications has been growing in leaps and bounds. This is especially true now since some excellent software for Morse code, RTTY, and SSTV have been available for some time for the Radio Shack, Apple, and other computers. This article describes a SSTV computer interface which is applicable to any computer, but was designed especially for the Tandy TRS-80C color computer and the associated programs from Clay Abrams Software.

The system was designed to be easy to build with special attention given to using easy to obtain parts. Three double sided plated through hole PC boards are used. All components are located on the main board by a silk screened legend, so assembly of the board goes quickly. The other two boards distribute the lines for front panel controls and rear panel I/O. These two boards make what is usually a mess of wiring a trivial task. Interconnection from the main board to the front and rear panel boards is accomplished by 6 inch long 16 wire ribbon cables with dip plugs on each end which plug into IC sockets on the boards. These cables can be purchased in any length from several parts houses ready to plug in, and at reasonable cost considering the amount of wiring saved, and the neat finished appearance. The front panel board is held in place by the stiff wires attached to the controls and the wafer switch. Cut off resistor leads are fine for this. The rear panel board has 5 mounting screws and is spaced away from the panel by nuts run down on the screws. The 6 RCA type connectors mount on the board and peek through oversize holes on the rear panel. The RS232, audio in, PTT, and audio out signals are routed to one end of the board so the builder can use any type of connector or a simple plastic strain relief. PC boards for this project may be obtained from the address at the end of this article.

An in depth description of the circuits would be too lengthy, but a brief run down through the circuits should be interesting to most readers. The schematics are broken down into two sections, the receive and sync circuits, and the transmit, signal switching and power supply circuits.

First a word about the power supply. Many projects of this type require the builder to supply his own power supply circuit, and at times this is one of the major costs of the completed system. The power supply circuit here was designed to fit the low power requirements needed by the opamps and CMOS devices, and it is included on the main PC board. The +10 volt section is well regulated by a three terminal device. The -10 volt section is derived from the bulk supply and consists of a 555 timer used in a voltage inversion circuit. It is not necessary that the negative supply be well regulated, since it is only used to provide bias to the operational amplifiers and the RS232 interface chip. All critical voltage references in the system are derived from the +10 volt regulated section. The inductor in the supply to the 555 is used to reduce the possibility of RFI from the inverter. It may be replaced by a jumper, but if you hear any whistles in your receiver put it in. Don't use a resistor. The 12VAC source is from a wall transformer.

The receive front end is patterned after the popular circuit described by W6MXV in the Slow Scan Handbook, December, 1972 published by 73 magazine. A quad opamp, U1, processes the input signal up to the frequency doubler. The first section limits the input audio to standardize the level. It has enough gain to provide a clean signal with less than 100 millivolts input. The next two sections are used to implement a 5 pole low pass filter. This filter is a Bessel filter with a linear phase characteristic, and will not cause any phase shift distortion. Its function is to reduce the amplitude of narrow noise pulses before they appear at the input to the comparator. The final section of U1 is connected as a comparator with hysteresis, and is used to square up the signal. Diode D5 clips off the negative portion of the signal leaving it at CMOS logic level.

U2 is a CMOS dual single shot chip connected so that each half will trigger on opposite transitions of the input signal producing two pulses of about 150 microseconds. These are combined with one section of U3 which logically functions as an OR gate. Its output is a signal of constant pulse width at twice the frequency of the incoming signal.

A nine pole low pass filter is used as the video integrator. It has a cut off frequency of 1kHz, and its output is down about 60 dB at 2400 Hz. The output at pin 14 of U4 is a DC level proportional to the input frequency with very little ripple. Unlike slope detector circuits, this output varies in a linear manner with a change of input frequency. U5 is used to shift the DC level to the proper levels, and the component values given result in 0 VDC at 1500 Hz and 5 VDC at 2300 Hz with the brightness and contrast controls at near midvalue.

The output of the frequency doubler is also fed to the sync circuits. The remaining two sections of U5 are used to detect the sync burst, in this case 2400 Hz since the frequency has been doubled. One opamp is an active band pass filter with a Q of 18. R32 is a trimpot used to peak the response at exactly 2400 Hz. The other opamp is an amplifier with the output offset negative. This offset prevents noise at other than 2400 Hz from forward biasing D6. When a sync burst is detected, the signal at pin 14 of U5 swings to +10 volts, and is rectified by D6. C20 and R37 filter the burst into a pulse. U3 squares this signal up. R39, C21, R40, and C22 form a low pass filter which separates the vertical sync pulse from the horizontal pulses. Another section of U3 squares this pulse up. Dual single shots U6 and U7 are triggered by the detected sync signals and generate accurate sync pulses of repeatable pulse width. In each case, when a sync single shot fires, it in turn triggers the other half of the same chip. This pulse gates off the input preventing the circuit from retriggering until the time out is completed. This is set for 58 msec for the horizontal noise gate, and 7.1 seconds for the vertical noise gate. These times are chosen to allow reception of stations using a 50 Hz line frequency.



All times are set with trimpots except for the horizontal pulse width which is used as a horizontal position control. The separated horizontal and vertical signals drive two sections of U10 which is a RS232 line driver. The sync signals are also combined with another section of U3, and after some logic gates, they are also available at an RS232 level. The sync logic controls this RS232 output depending upon several conditions. First of all, during reception, U8 drives a tuning meter and a sync gate. If sync is not being detected, the sync output will be gated off preventing a display of random noise. (Some receiver noise will cause intermittent gating resulting in the first few lines of the display to scan.) In the transmit mode, (PTT low) external sync will be gated to the RS232 output if the mix mode is selected, but in receive, normal receive sync will be at the output.

The heart of the SSTV modulator circuit uses an Exar XR2206 function generator chip. The voltage on pin 9 selects, via the RS232 input, which set of frequency setting components are in the circuit. One half of U18 amplifies the computers D to A output (cassette out on the TRS-80C) and trimpots R58 and R64 set the black and white frequencies respectively. R61 sets the sync frequency, and R69 sets the output level. R57 and C32 form a lowpass filter to prevent transmitter RF from interfering with the input of U18. Similar RC networks are used throughout the input and output circuits for the same reason.

Transmitt audio source switching is accomplished by half of a CD4052 FET analog switch which is controlled by the source control logic. The other half of U18 buffers the analog output to the audio input of the transmitter. The control logic is conditioned by a two pole four position switch, and the video/voice toggle switch over rides any of the four positions when it is in the voice position. In position 1 video from the modulator is selected. In position 3 an external video source is selected. This can come from any video source, but an associated external sync input allows video mixing with the computers video if position 2 is selected. Position 4 selects another video source such as a tape recorder, etc. The station microphone is also routed through the analog switch. This set of switching combinations provides the SSTV'er with most of the usual switching functions needed, and keeps messy external wiring at a minimum.

There are several adjustments that have to be set before the system will operate correctly and some test equipment is needed. The software from Clay Abrams has in the menu of features a set up procedure which provides the correct levels to the modulator for sync, black, and white frequencies. With the transmit switch on, the video/voice switch set to video, and the transmit video source switch set to computer, select from the computer keyboard each of the levels in turn. Adjust R61 for 1200 Hz sync, R58 for 1500 Hz black, and R64 for 2300 Hz white. The black and white adjustments interact so they will have to be made several times until they track. R69 sets the output level and it should be about the same amplitude as a whistle into your microphone. If you don't have a counter to set the frequencies accurately a local friend with one could help on a simplex two meter frequency. All you need to do is get the audio into the two meter rig microphone line or use a small amplifier and speaker. R88 is on the back panel PC board and is used to set the level of the external modulated video so that it is the same level as the signal from U12. This is important with video mixing and program SSTV 7.3. The level for the tape or aux. input is set from the tape recorder or external device.

Now that the modulator is set up, it can be used to help setup the receive circuits. Connect a jumper from the modulator output to the audio input. Select the sync frequency from the computer keyboard and adjust R32 for a peak on the tuning meter. Rock the adjustment back and forth until the meter drops off on each side. Set the adjustment midrange. This will be a fine adjustment. Next select the black and white frequencies alternately. Monitor the voltage at the video output jack and adjust the brightness and contrast controls for 0 volts and 5 volts respectively. Install knobs on the controls so that the pointer is aligned upward. This will allow returning to the correct levels if you make a small change for some pictures.

Adjusting the sync single shots accurately without a calibrated oscilloscope or period counter will be a problem. Fortunately the horizontal position control sets the horizontal sync pulse width and the results can be seen on the display. Changing the value of R41 will vary the range of the horizontal position control. The horizontal and vertical noise gate trimpots should be set for minimum resistance initially. The system will work at these settings. There is a routine in SSTV 7.4 which will look for horizontal and vertical sync pulses. Use of these aides will get the system operational. Use a prerecorded tape for a picture input and watch the screen for the pulse present indication as described in the instructions for the I command. Adjust the vertical trimpot R51 for proper operation. If you wish to disable the vertical sync noise gate in order to receive two vertical sync pulses in a row, connect a 6.8K resistor from C28 to +10 volts. This can be done through a front panel switch to select the option. Another front panel option might be a control for R32, a RIT type of control for the sync. Keep in mind however that if this is off the video output accuracy will suffer.

PC boards with instructions, parts list and parts source information are available from:

Dynamic Specialties  
PO Box 20903  
San Jose,  
California 95160-0903

The cost for the three board set is \$39.00 USA currency and \$1.00 ( \$1.50 for first class ) for shipping and handling. California residents add 6.5 percent state and local taxes. Add \$1.00 for insurance. (Not responsible for uninsured parcels) Send check or money order. No bank cards or C.O.D.'s please.

In general all the parts for the main board are available from one popular mail order parts house, and the remaining parts from your neighborhood parts shack or mail order. A filled out order blank from a mail order firm is included with the PC boards to simplify parts ordering.





PHOTO 1.

PROTOTYPE K6KLO  
COMPUTER INTERFACE  
ON TRS-80C COMPUTER  
IN FINISHED FORM  
WITH METER AND CONTROL  
SWITCHES MOUNTED.

PHOTO 2.

LOOKING INSIDE  
THE INTERFACE  
UNIT SHOWING PC  
BOARD AND CONTROL  
JACKS AND SWITCHES.

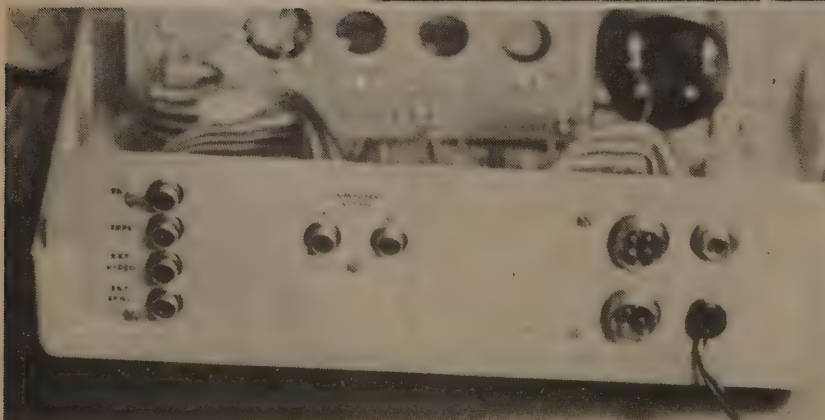
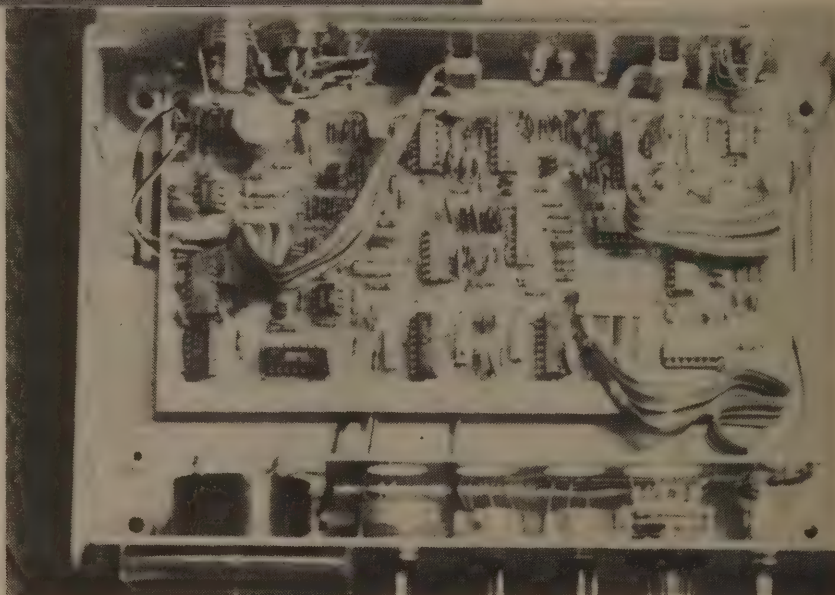


PHOTO 3.

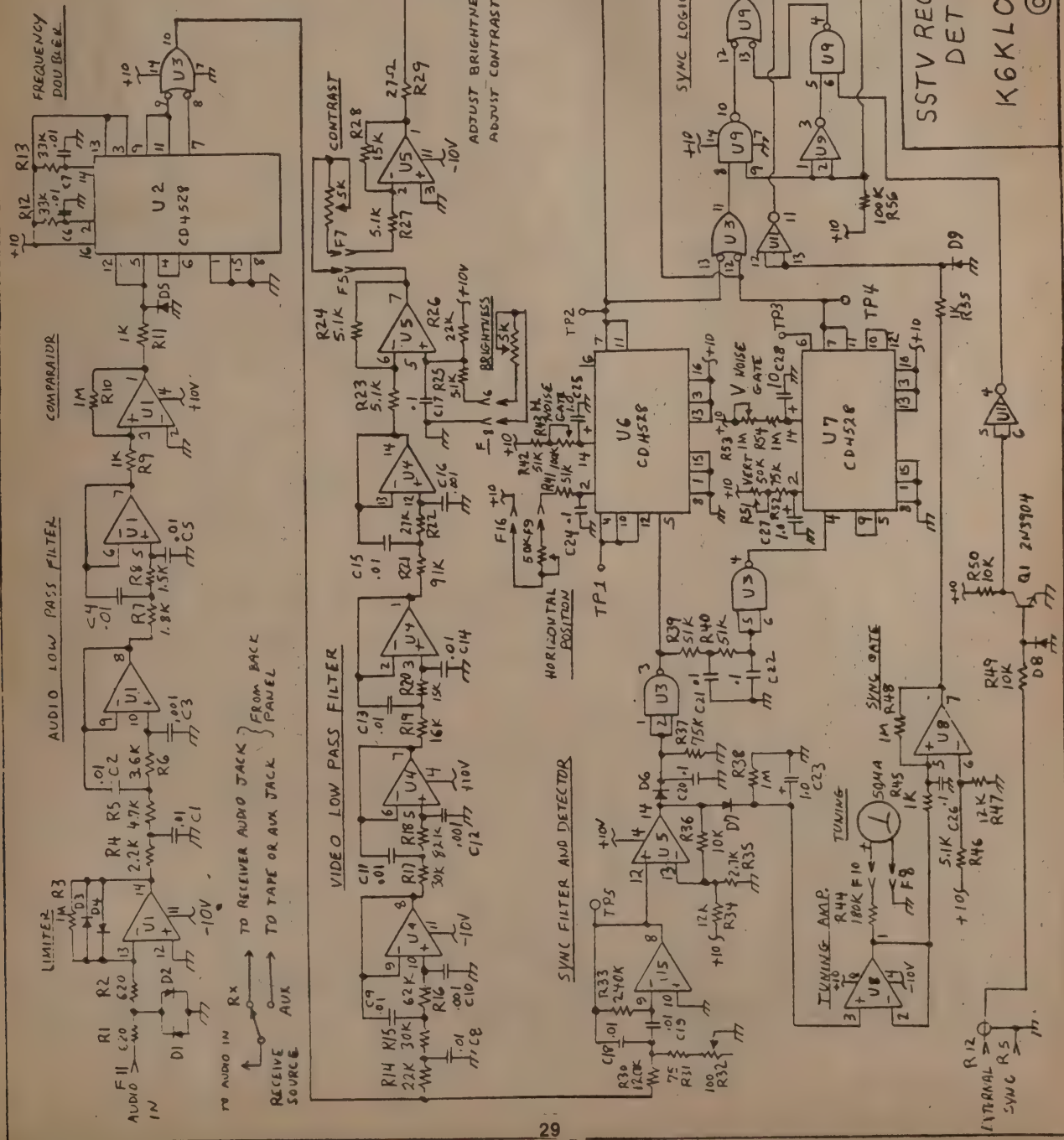
REAR PANEL CONNECTION  
JACKS ON COMPUTER  
INTERFACE UNIT.

"UPCOMING IN A5; RTTY INTERFACE FOR THE COLOR COMPUTER WITH TUNABLE  
SHIFT PRINTING BY K6KLO - COPY ANY SHIFT WITH MULTI-BAUD RATE"



- U1, 4, 5 -- LM1345M OR MLC3403P  
 U8 -- -- LM1458CN  
 U3 -- -- CD4093  
 U9, 11 -- CD4011  
 U10 -- -- LM1487N  
 U2, 6, 7 -- CD4528  
 ALL DIODES -- 1N4148  
 Q1 -- -- 2N3904  
 RESISTORS R1 - R56 1/4W  
 CAPACITORS C1 - C31

- TEST POINTS  
 TP1 HORIZONTAL NOISE GATE 58mV  
 TP2 HORIZONTAL SYNC 5mV  
 TP3 VERTICAL SYNC 30mV  
 TP4 VERTICAL NOISE GATE 7.1 SEC  
 TP5 ADD R32 FOR MAX WITH 1200 HZ SIG. IN.

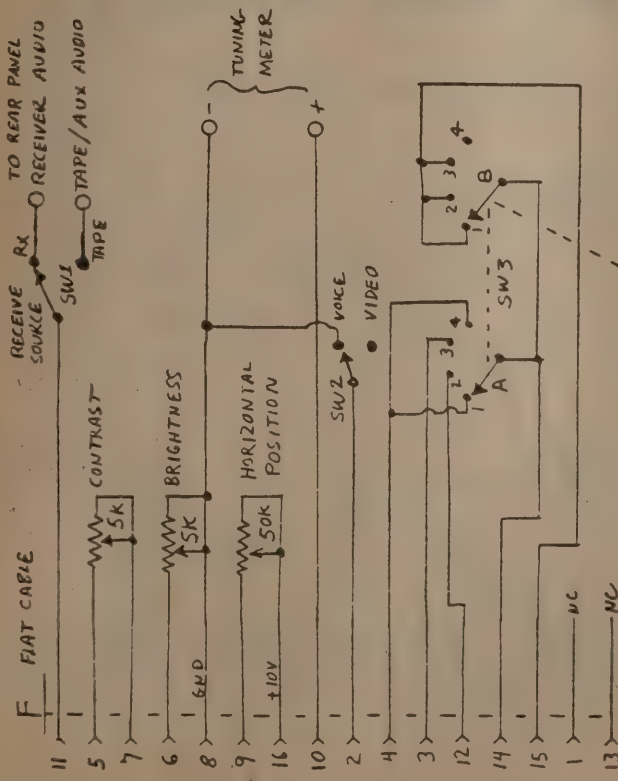


SSTV RECEIVE VIDEO AND SYNC  
 DETECTOR CIRCUITS  
 K6KLO DAVE SARGENT  
 ©1982 DS





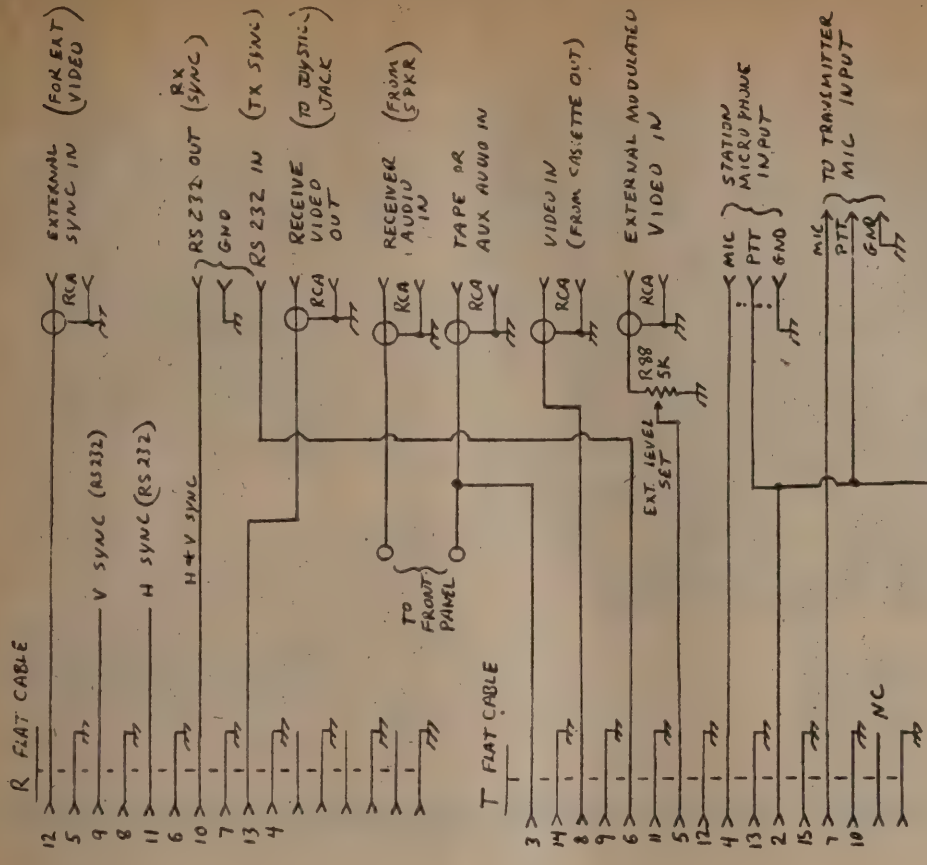
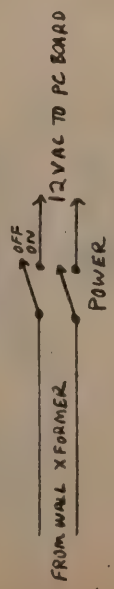




TRANSMIT VIDEO FUNCTION

1. COMPUTER
2. MIX MODE
3. EXTERNAL
4. TAPE/AUX

FRONT PANEL WIRING



SSTV IO INTERFACE  
FRONT AND REAR PANEL WIRING-  
K6KLO DAVE SARGENT  
© 1982 DS



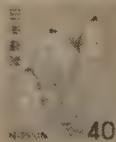


## A5 MAGAZINE'S "SHACK OF THE MONTH"

**JG1DDT**

KATSUHIKO KAMBARA  
925-1 MINAMIOH KUWA,  
KAZO-CITY, SAITAMA  
NIPPON, JAPAN-347

Katsuhiko is editor of a regular SSTV column in CQ Ham Radio (Amateur Radio publication in Japan) and is active in SSTV, FAX and RTTY. He is also vice-chairman of JASTA (Japan Amateur SSTV Association) for 5 yrs.



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# SLOW-SCAN TELEVISION IS AN "INTERNATIONAL" MODE OF COMMUNICATIONS VIDEO PICTURE TRANSMISSIONS GAIN POPULARITY

Katsuhiko Kambara JG1DDT of Japan reports to A5 Magazine that activity is monitored quite regularly in JA-land on SSTV stations. Katsuhiko writes a regular TV Slow-Scan column in the national Amateur Radio magazine "CQ-JA". Here is his March 1982 column. Look closely at the entire article and you'll see some recognizable U.S. callsigns. Maybe one of them is yours? Thanks Katsuhiko JG1DDT!

## Here & There

### SSTV

JG1DDT 神原克彦

カナダで-100°F, アメリカは308人の凍死者, オーストラリアでの44°C, と地球上の極寒, 猛暑ときびしい気象条件のなかですが, ピロピロッと力強くアクティビティを!

## HERE & THERE

▶OH5RM...JASTAからの資料でSC-77を100枚製作し, SSTVのアクティビティが高まる。キーボードはWφLMD方式, モニターはナショナル, カメラはトヨー, と日本製を使用。カラー化の情報が欲しい。(Txn JA2CCA)

▶WAS SSTVコンテスト...2月13, 14日の36時間コンテストに参加された方, ログ提出先は下記へ, また詳細はA5マガジン Jan./Feb., VOL. 12

A5 MAGAZINE,  
P.O. BOX H, Lowden,  
Iowa, 52255 U.S.A.

▶G3WW...超OM Richard(1905年生)からSSTVの近況として, 1980年は新局QSOが189(27カントリー)で1981年は94局(24カントリー)と1stのSSTV交信ができた。

ヨーロッパその他のカラーSSTVの現況は,

①ロボット400を3台使った方式(G3NQX)

②ロボット400を3メモリーに改造した方式(G3MES, ZS6BTD&SM5EEP)

③ロボット400またはSC-77にW9NTP考案の2メモリーを追加した方式(G3CCJ, G4CZT, G3JRL, etc.

④400に2メモリーを追加した方式(V3EGO)

⑤SC422aに2または3メモリー

## SSTV WORKED & VIEWED. ΔはVIEWED.

HL1AG	1436	14225	JG1DDT	N911A	0950	28683	JA1PGH
W9LTI	1326	4229	JA1PGH	W9LTI	1045	28683	JA1PGH
KD6AW	1312	4	JA9WMS	W9DQ	0948	28685	JA1XGI
WB9EV	1328	4	JA9WMS	K0HIT*	0745	28680	JA1XGI
V17EZY	1320	4227	JA1XVY	KA1BGC	1036	28683	JA1XGI
VK2DL*	1836	4234	JA1PGH	KA2IOY	0800	28680	JA1XGI
VK3JM	1925	4232	JG1DDT	WA4RLR	0840	28680	JA1XGI
ZS6BTD	1254	4230	JA7BAL	KA6BRT	0845	28680	JA1XGI
VK3BHZ	1930	21310	JG1DDT	WAGNOK	1026	28	JA9WMS
AD6X	1035	28681	JA1PGH	KA7CJL	0930	28685	JA1XGI
F74DQ	0745	28678	JA1XGI	KA9FE*	0840	28680	JA1XGI
N3DLB	0940	28685	JA1XGI	KA9JWK	0910	28680	JA1XGI
W4CVS	0818	28680	JA1XGI	WB4PFB	0839	28683	JA1PGH
K4KUG	0905	28676	JA1PGH	WB5UDU	1054	28684	JA1PGH
W5FPO	0930	28683	JA1XGI	WB9CW	1045	28684	JA1PGH
K8KFC*	0939	28680	JA1PGH	WB7YH	1010	28680	JA1XGI
NSSJ	0921	28675	JA1PGH	KD6AW	0853	28682	JA1PGH
K6AEP	0920	28679	JA1XGI	LL1H1J	0820	28680	JA1PGH
W2DPS*	0915	28680	JA1XGI	LL4HSD	1045	28680	JA1XGI
W71BI	1244	28	JA9WMS	LL3Q	0904	28685	JA9WMS
W8GMH	0940	28680	JA1XGI	ZS6BTE	1530	28680	JA1PGH
W9EWC*	0919	28679	JA1PGH				

●他にレポートあり

とした方式(ZS6BTD, G3KJF, SM5EEP, etc.)

⑥SCをマイコンでコントロールして3メモリーとした方式(G3OQD)

上記の各方式でUSA, イギリス, 南アフリカ, イタリア間にてカラーによる交信がされていますが, まだまだB/W QSOにはおよばない。なお, SC-77をOH5RMからイギリスの約35局が入手してオン・エアしており, UKでのSSTV局は, 現在50から100局程度です。1982年がJAをはじめSSTVにとって, ベストの年となりますように!

(Txn G3WW)

## VIDEO SNATCH

・JA1XGI...28MHzのFY7BQはNew. K6AEPのTRS80Cのソフトウェア資料を入手しました。必要な方には差し上げます。

・JA1XVY...カラーSSTVの第二として, JA8FKS方式を製作準備中。

・JA4IXI...SC-77に4本のリード接続で, ライトペンを楽しんでいます。資料はRadio Communications, December 1980にG3OQDが掲載したもの。

・JA6OAC...カラー・カメラを購入して色っぽくするための情報待。

・JA7BAL...12時ごろにアフリカがロングパスで, 10時ごろの28MHzの北米方面がよく見えています。

・JA8FKS...カラーSSTVのフレーム式(順次送出)およびライン式(同時送出方式)の2色, 3色といずれも切り替え可能を完成しました。総集版を整理中で, 近日公開を予定しています。

・JA9WMS...C/Gが煙を出しました。電源部をスイッチング電源に作り変えました。



第4回SSTVアクティビティ・コンテストにて海外プロ・アマチュアSP2JPG。ホーランドの国境が心配な Wojciech (Txn JA6ARW)

Clay Abrams K6AEP of San Jose, California and Takao Yabana JA0BZC of Japan were featured on national Japanese Television on the 6:30 pm. report. The 15 minute videotaping showed actual on-the-air communications with Color SSTV. Photos were exchanged between Clay and Takao and his family at P5!



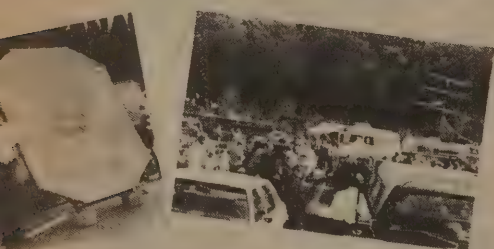
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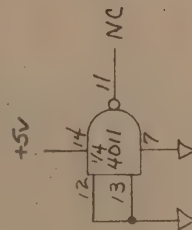
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2. DISCONNECT ORIGINAL WIRES ON OUTSIDE TERMINALS OF RGB SWITCH. RE-CONNECT THESE TWO WIRES TO POINTS (X) & (Z) AS SHOWN ABOVE.



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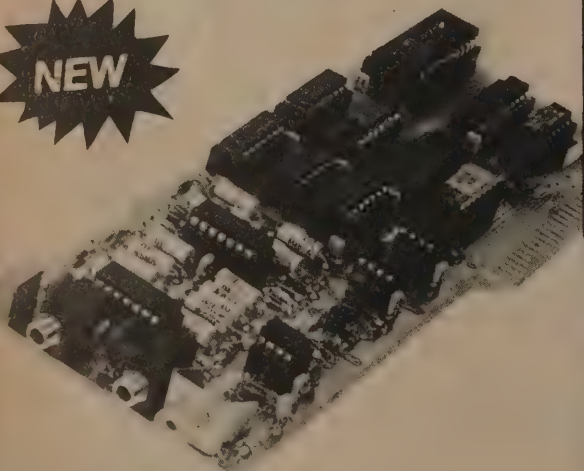
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**Black And White** pictures are processed with a resolution of 128 by 128 pixels and 16 levels of gray. Shades of gray are presented on a standard CRT monitor by using dot dithering. In the color mode, 8 colors are available with 16 saturation levels. Color pictures are taken with an unmodified black and white TV camera using a three-frame RGB sequence. Standard RGB transmission formats are available in addition to a unique APPLE-to-APPLE single frame color mode which takes 8 instead of the usual 24 (or more) seconds to transmit a color picture.

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# BOY SCOUTS OF AMERICA "SPECIAL EVENT CW/SSB/RTTY/SSTV STATION" ACTIVE

## SPECIAL QSL CARD CONTEST INCLUDED DURING OCTOBER EVENT

For 25 years ham radio and Scouting have been cooperating in the extension of world friendship. Jamboree-on-the-Air, held annually on the third week-end of October, sponsored by the World Scout Bureau, in Switzerland, has encouraged Scouts to exchange greetings on the ham bands. That includes Boy Scouts, Girls Scouts, their leaders, former Scouts and anyone interested. Some contacts have led to long range pen pal friendships and some eyeball visits.

ATV, especially longer range SSTV, adds another interesting dimension to the exchanges. Now Scouts may see one another and can better see the similarities of uniform, badges and insignia. And perhaps see that there is not too much difference between Jose, John and Pierre.

Each year finds more such SSTV activity in the 50 states as well as in DX-land.

For a weekend of some good turn ham radio, invite some Scouts to your shack for JOTA and to see ham radio in action. If you do not know any Scouts, call you Boy Scout office or Girl Scout office. See the yellow pages. They will give you the names of nearby Unit leaders.

DATE: October 16-17, 1982

TIME: Generally 0001 UTC on the 16th to 2400 UTC on the 17th. But since it is not a contest and some operations are from camporees, things will roll from Friday to Manday.

CONTACTS: No required exchanges, just Scout greetings and talk.

FREQUENCIES: Phone: 3,940; 7,240; 14,290; 21,360; 51,150. CW: 3,590; 7,030; 14,070; 21,140; 28,190. SSTV and RTTY on usual frequencies.

CERTIFICATES: Post card size certificates of participation, like QSL cards, are available from the USA JOTA Coordinator W2GND, 216 Maxwell Ave., Hightstown, NJ 08520, for issue to anyone participating in any way. You may want to send one along with your QSL to any contacts that made. Send SASE. Logs or lists of participants are not required, but after action reports and photos are welcome for possible publication. Send them to the Coordinator mentioned above.

FCC regs must be adhered to. See the third party traffic note in QST, June issue, page 90, pertaining to formal messages. (When does an SSTV image on a tube become third party traffic?)

### SPECIAL QSL CONTEST

For the first time, the World Scout Bureau has included a QSL card contest in the JOTA program. Now you may invite some Scouts to design a nice card for your use, and theirs, to acknowledge contacts. Usual format: one side to carry QSL info; the other to have a cartoon, picture, badge, emblem or insignia.

The World Bureau is offering five prizes for the best hand made cards and five prizes for the best printed cards.

### RULES

- Cards must be designed by Scouts, age limit 18, and JOTA participants.
- Entries cannot be returned but will be displayed at the next World Jamboree, Canada, 1983.
- Card must include designers name, address, age, Scout Unit and Scout country, Like "Boy Scouts of America" or "Girl Scouts of the United States of America"
- Entries must be received by December 31, 1982. Mail to JOTA QSL Contest, World Scout Bureau, P. O. Box 78, 1211 Geneva 4, Switzerland.





# SLOW-SCAN TELEVISION SPECIFICATIONS AND TECHNOLOGY

## CLAY ABRAMS CLEARS UP COMMON MISCONCEPTIONS



CLAY ABRAMS K6AEP  
1758 COMSTOCK LANE,  
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A5 ATV MAGAZINE  
"Feature Article"

During the past two years the world of amateur radio SSTV has exploded with new equipment, technology and terminology. As with all growth, at some point in time it is advantageous to step back and try to place everything in proper perspective.

Obviously the first place to to start is to review what has been done in the past. SSTV is really a modification of standard fast scan television. Much of the work which has been done in basic fast scan TV was done in the 1940's. It is interesting to understand how these specifications were derived, and how they relate to our current hobby. Many of you might ask who cares? Trends in SSTV have shown that the digital computer are the way of the future in SSTV. Because of this trend we should plan ahead and possible revise current transmission and reception specification to move ahead as technology advances.

### CURRENT TELEVISION SPECIFICATIONS

All Fast Scan television specifications currently in use can be derived from the Film industry. Likewise all SSTV specifications are derived from fast scan TV. Fink (ref 1) gives an excellent review of how the Fast Scan TV specifications were derived. The major difference between SSTV and fast scan TV is resolution, and bandwidth. SSTV is a 1000 percent reduction in bandwidth from fast scan TV. Due to this lower bandwidth it is possible to transmit SSTV over any electronics device with bandwidths of 1.2 KHz.

Resolution is a term which has rarely been addressed in SSTV. But with lower memory costs it is now possible to construct scan converters with resolutions approaching fast scan TV.

Resolution is really a measurement of how well a system can display a grid of fine spaced vertical and horizontal lines. The lines are placed as close as possible, then captured by a TV camera and displayed.

Since everything is derived from film lets see how good the resolution is on film. Lets first look at 35 MM film. This film has a physical area of 20.95 mm wide by 15.25 mm high. If you divide the width by height you will get a ratio of 4 to 3. This is how the TV aspect ratio was derived. Tests have shown that the smallest number of lines which can be resolved by 35 mm film is 55 lines per mm (ref 1). This is equivalent to 110 television lines. Multiplying the picture size by the dimensions of the film a resolution of 2310 lines horizontal, or 1680 lines vertical can be displayed. Fink (ref 1) states that the best method of defining resolution is to multiply the vertical and horizontal resolutions together to give the resolution of an entire frame which is 3,880,000 squares or pixels.

Since we are really interested in fast scan television lets look at its resolution. Baldwin (ref 1) determined that fast scan television has a resolution of 466 pixels by 350 lines or 163,100 pixels per frame.

Since current digital SSTV has a known pixel ratio the resolutions per frame can be easily calculated. Table 1 provides some calculations which compares film, fast scan TV and SSTV.

### TELEVISION RESOLUTIONS VS. FILM

Mode	Horiz	Vert	Aspect	Pixels	Percent
35 MM	2310	1680	4:3	3,880,000	2378
16 MM	1070	790	4:3	845,300	518
TV USA	466	350	4:3	163,100	100

SSTV	128	128	1:1	16,384	10
SSTV1	256	128	2:1	23,768	20
SSTV2	256	256	1:1	65,536	40
SSTV3	253	190	4:3	48,070	29

It is interesting to note that current SSTV specifications with units similar in design to the robot 400 can resolve images with resolutions only 10 per cent of fast scan SSTV. Other SSTV formats can improve the quality of the picture by either changing the aspect ratio or adding more pixels.

### DIGITAL SSTV

Digital TV is a relatively new. This technique is becoming popular in both the home and commercial market. Most digital scan converters take a standard analog TV camera and by digital electronics samples the analog signal with an analog to digital converter and places the results in a large digital memory bank. To display the image the memory bank is refreshed (addressed) at a rate of fast scan TV and displayed as a TV image.

Wintz (ref 2) in his recent book performed some experiments to determine the effects of varying both pixels per line and gray levels. The criteria was to compare the image to the analog original and determine the minimum number of pixels and gray levels necessary to display an equivalent image.

#### 1. Pixels and lines

Wintz found that a good image which approximates fast scan TV is 512 pixels on 512 lines or 256 X 256. The image quality was considerably degraded with 128 pixels on 128 lines.

#### 2. Gray levels

Gray levels of 256, 128, and 64 produce images of acceptable quality. A 32 gray level image produces false contouring and was more pronounced at 16 gray levels.

#### 3. Picture content

The number of gray levels producing acceptable images varies as a result of the image displayed. When a picture contains lots of detail the effect of more gray level was less important than with pictures of human faces.

### COLOR SSTV

Color SSTV is probably one of the least understood modes of SSTV currently in use by amateurs. Much folk lore and incorrect information is currently available to the uninformed amateur. Color SSTV is really the mixing of three black and white SSTV frames to create a single composite color picture. The mixing is accomplished in the picture tube in some schemes and in all systems the resolution is only as good as black and white SSTV. If a system with a resolution of 16,384 pixels per frame can only be 10 per cent of the fast scan equivalent.

In most color systems the transmission on SSTV is accomplished by transmission of a frame of the red picture,



then the green picture, lastly the blue. Various experimental so called single frame picture are currently being transmitted over the air. These techniques are nothing more than placing the horizontal sync pulse at different points in the composite picture. These techniques cannot improve resolution from black and white and can not be displayed on standard black and white equipment. Their only advantage is to immediately display a color image. To date no standard has been established for single frame color.

Another misunderstood term misused is aspect ratio. The only way to produce a 4 to 3 aspect ratio is to transmit a picture with more horizontal resolution than vertical. If the scheme that is used has 253 pixels horizontal, to produce a 4 to 3 aspect ratio 190 vertical lines must be transmitted. This will make the resolution ratio equivalent to standard television and will take approximately 12.7 seconds to transmit.

In a system similar to the so called "Three memory Robot", a total of 4096 colors can be displayed. These colors are similar to mixing paint. The number of colors which any system is a simple calculation. For example the robot has four digital bits per black and white picture pixel. This is equivalent to 16 gray levels, if you sum three pictures together you have a total of 12 bits. Since, this is a binary representation to determine the total number of combinations or colors in this case is equal to 2 to the 12th power or 4096. To the best of my knowledge no one has ever considered the acceptable level which the human eye can see and tolerate SSTV colors. If a good picture can be displayed with less bits the cost and complexity of the system can be greatly reduced.

Around the turn of the century Wilhelm Ostwald (ref 3) investigated and classified a list of colors which he could observe. He was able to classify 24 monochromatic (primary) colors each with 28 hues (shades). This gives a total of 672 unique colors. His work has been expanded over the years by others to classify more colors. It would be interesting to experimentally determine the minimum number of colors which produce acceptable images. Some experimental results appeared in July 1982 Popular Science Magazine, they claimed that 8 bits or 256 colors produced acceptable images. I must admit the TV picture in the magazine looked very good.

Another point which has not been considered in color SSTV is the visual acuity of the human eye. Baldwin (ref 1) determined that the human eye's ability to resolve fine detail (acuity) varies with the color. Further tests determined that the green TV frame to be the most critical and contains the most detail. The blue frame acuity is less than 35 per cent of green, and red is less than 75 per cent of green.

Fink (ref 1) went as far to suggest that the three frame color system for television should be adjusted for visual acuity. This means that the blue and red frame can be greatly reduced in content and the composite color picture will not be degraded. This technique if employed would additionally reduce hardware costs and simplify systems.

## CONCLUSIONS

SSTV to date has shown a complete lack of planning. Some of the recent work in color SSTV has been done for profit of a few, not technical advancement of picture quality or low hardware costs. Picture quality and specifications have been a defacto by-product dictated by ease of quick design and fast profit.

With careful design and planning it is possible to produce less complex low cost system with better resolution than older Robot based systems. However, to do this cooperation and communications between developers must be established to create new standards. If this does not occur a number of defacto systems will be established which can split our small SSTV community into a number of sub interest groups all competing with each other.

## References

1. TV Engineering, Donald C. Fink, 1952 Mc Graw Hill
2. Digital Image Processing, Rafael C. Gonzalez and Paul Wintz, Addison-Wesley
3. The Color Primer of Wilhelm Ostwald, edited by Faber Birren, Van Nostrand Reinhold

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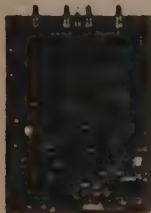
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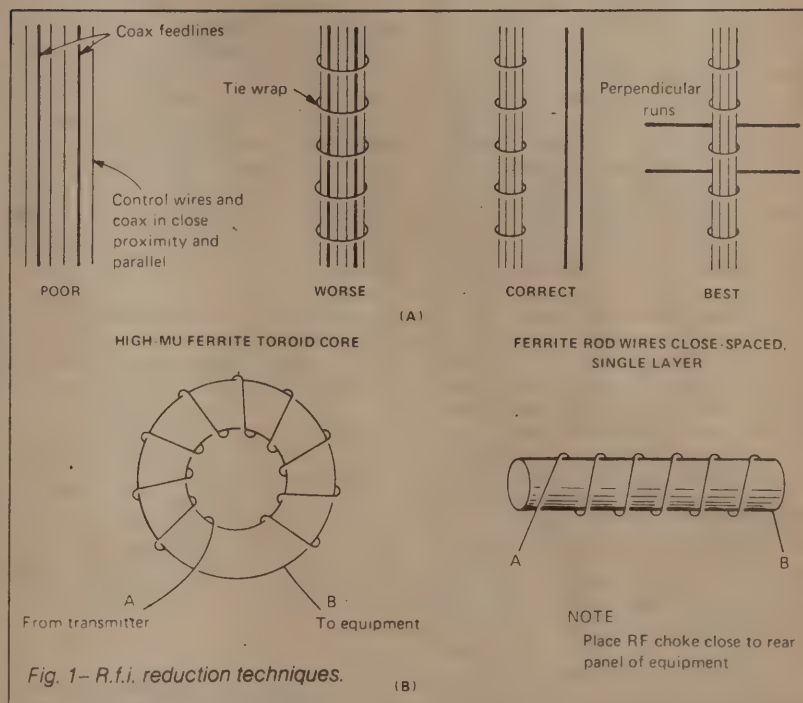
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# R.F. Induced Problems And Solid-State RTTY Terminals

Over the past 10 years, there has been an explosion in RTTY activity on the amateur bands, due largely to readily available solid state RTTY terminal equipment. As the electronic industry in general has become more and more dominated by digital techniques, our interests as amateurs have also expanded to include digital techniques. Today, amateurs are either building their own solid-state digital RTTY equipment or buying commercially manufactured RTTY gear. The solid-state terminals offer many features over their mechanical predecessors, features that were just not feasible with machines. The solid-state terminals are also quieter and smaller than the machines and they don't drip oil on the floor!

However, the digital terminals do have a weakness that rarely bothered a mechanical TTY machine—r.f.i. from the transmitter. Unfortunately, it is the very nature of the small low-voltage device that makes all the extra features possible. Consider, for a moment, the tube radios and RTTY demodulators we used in the 1950-1965 period; the circuits in that equipment operated from a 150 to 300 volt power supply, and stray r.f. voltages of 0.1 to 5 volts would rarely cause a problem. On the other hand, modern digital circuitry operates from a 5 v.d.c. power supply, and a 1 volt stray r.f. signal will definitely affect its operation. The digital circuits are designed to operate at very high switching speeds, and the addition of a 20 or 10 meter r.f. signal will just be interpreted as a high-speed digital signal, often causing the terminal to "blow-off into space." All is not lost, however, a digital terminal can be made to work with even the highest powered amateur transmitter if suitable precautions are taken in both their design and installation. Although each r.f.i. solution tends to be slightly different, depending upon the particular characteristics of each installation, there are some recognized techniques that should help your situation.

First, the digital terminal **must** be con-



structed so that it is *itself* well shielded and includes internal r.f. bypassing of all input and output connections (including the a.c. power connection). There is *no* good substitute for a metal shielding enclosure! The shielding and bypassing serve a two-fold purpose: (1) they keep the transmitter r.f. from getting into the terminal, and (2) they keep the digital r.f. "noise" from escaping to interfere with the receiver. The lack of r.f. shielding in plastic cabinets has been a particular problem for amateurs using hobby computers, and it is the reason behind the recent FCC r.f.i. regulations (Part 15, Subpart J) requiring r.f.i. suppression. Some plastic cabinetry now being manufactured includes special conductive coatings

to achieve r.f. shielding. However, the shielding materials are expensive, and the do-it-yourself amateur will be time and money ahead if he builds his digital equipment in a metal enclosure.

Most of the commercially available amateur RTTY terminal equipment has been designed to operate in close proximity to radio frequency transmitting and receiving equipment. Particular attention should have been paid to the shielding and by-passing of the terminal circuitry. However, under certain conditions in an r.f.-saturated environment, the terminal may still be susceptible to r.f.-induced interference. This may manifest itself in any of a number of ways, such as partial or complete lack of response to switches



or keyboard operations, or erratic behavior of the video display.

The first thing that should be checked if r.f. problems are suspected is the **ground** system. The transmitter should be properly grounded for r.f. (in addition to an electrical safety ground), and all other station equipment grounds should be connected to the transmitter chassis. The r.f. ground should consist of a short length of heavy copper wire or braid terminated at a good earth ground (ground rod, cold water pipe, etc.). If a water system ground is used, be sure that the pipes are 100 percent metal from the connection point to the water mains; plastic plumbing obviously will break the ground path. If the distance between your transmitter and ground connection is more than a quarter wavelength at the highest operating frequency, make the ground wire an integral number of half-wavelengths long. If you plan to operate 10 and 15 meters, you may need to run separate ground wires for each band.

Stations located on the second floor of wood frame houses can present special problems for r.f. grounding. One technique that has worked well when none of the usual ground returns work is to spread copper screen material on the floor of the room under the operating position. The equipment ground is then attached to the screen with one or more low inductance leads. The screen creates an "artificial" ground plane in the room. A carpet is usually placed over the screen to improve the appearance of the room! Consult any of the amateur handbooks or antenna books for a more in-depth discussion of grounding techniques.

The best way to confirm that a problem is caused by r.f.-induction is to temporarily eliminate the source. This may be done in stages, starting with a partial reduction in exciter drive, and ending with transmitter shut-off. Since r.f. energy may be induced in the terminal through several paths, connecting the transmitter to a dummy load may not eliminate *all* r.f.-related problems, although this is an excellent first step in verifying r.f. problems.

Radiation of r.f. energy from linear amplifiers, antenna tuners, coaxial switches, monitor scopes, and interconnecting coax-cable jumpers is also possible. In fact, it is this type of radiation that is most likely to be coupled into nearby I/O and power cables of the terminal. To locate the point or points of radiation, experiment with different cable arrangements to see if the r.f.-induced problem can be eliminated by reducing coupling between any of the terminal cables and nearby coaxial lines carrying r.f. power. Fig. 1(A) shows several cable arrangements, both good and bad, showing how to keep r.f. coupling to a minimum. Fig. 1(B) shows how to use high- $\mu$  (950-2000) ferrite toroids or rods to choke the flow of r.f. on audio and control lines.

If cable rearrangement doesn't yield positive results, then begin eliminating pieces of equipment and sections of coaxial cable until the transmitter is connected directly to a shielded dummy load. As each piece of equipment is removed from the transmission line, check to see if the r.f.-related problems have diminished or disappeared. If the r.f. problem persists with the exciter connected directly to a dummy load, reduce the drive level to see if that eliminates the problem.

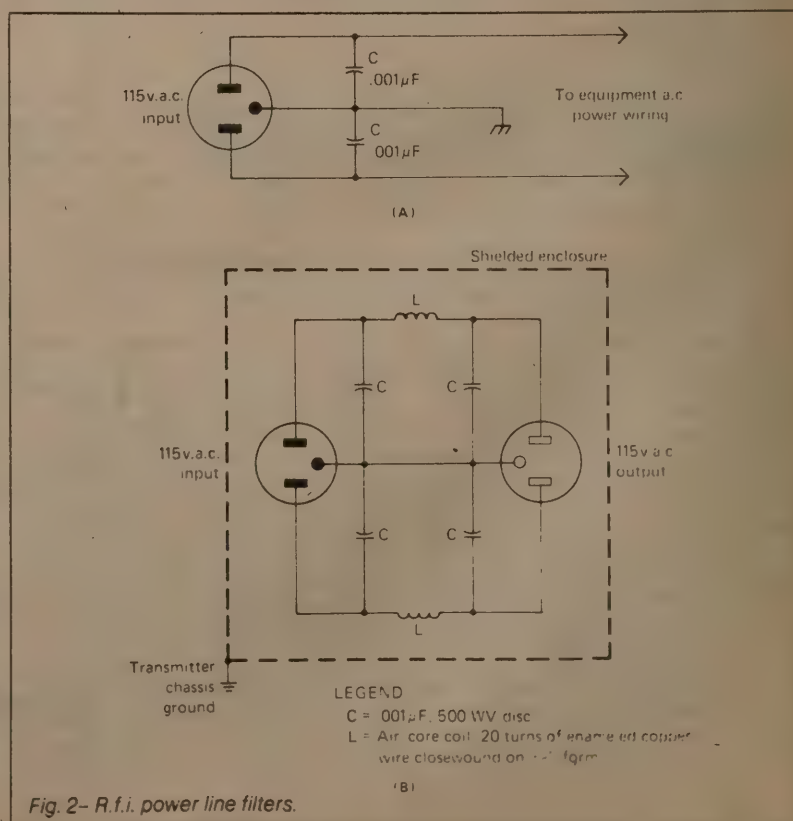
If operation into a dummy load does not significantly reduce the r.f.-related problems, disconnect all I/O cables from the terminal. Test the operation while it is connected only to a.c. power. At the same time, enable the transmitter so that it sends a c.w. signal into a dummy load. If r.f. problems are still present, then r.f. energy is probably being introduced to the terminal through the power cord by way of the common a.c. mains power line. This is usually indicative of poor a.c.-line filtering in the radio transmitter power supply section. Fig. 2(A) shows a common by-pass filter method used in many transmitters. Figure 2(B) shows a "brute-force" a.c. line filter that can be added to the transmitter or other equipment to eliminate the flow of r.f. on the a.c. power line.

In addition to the liberal use of r.f. bypassing capacitors on station equipment, the use of certain antennas may offer reduced levels of r.f. in the radio room in

many cases. Whenever possible, use **resonant** dipole, vertical, quad, or Yagi antennas and try to achieve a good impedance match **at the antenna** instead of relying on an antenna tuner. Random-length wire antennas and others that require extensive antenna tuning are more likely to create high levels of r.f. within the vicinity of the operating position.

The location of the transmitting antenna with respect to the radio room also has an effect on the r.f. energy that is coupled into interconnecting cables. Apartment dwellers may have the most difficulty achieving a good installation, since many times an indoor antenna is the only type allowed. Where outdoor antennas are allowed, they should be placed as high as practical. Not only will this provide for better reception and transmission, but it will also reduce the level of r.f. in the shack. Also, if possible, avoid bringing an end of a half-wave dipole in close proximity to the operating position; there is a high voltage field at the ends of the dipole that may be hard to shield.

In general, a shielded, coaxial cable feedline with low s.w.r. is much preferred over open wire, twin-lead, or single wire feed systems. The self-shielding property and lower voltages present act to make the coaxial feedline much less susceptible to radiation of r.f. energy in the shack rather than at the antenna. R.f. energy may also find its way back to the station by conduction down the outside of the co-



axial cable shield. This may be a particular problem with half-wave dipoles on 40 and 80 meters that are center-fed with only coaxial cable. A balun at the antenna tends to reduce this problem. Also, dress the coaxial cable from the balun so that it drops *perpendicular* to the dipole, rather than parallel. In stubborn cases, you may find that dropping the coaxial cable clear to the ground and burying it (5 or 6 inches) for the horizontal run to the shack may help reduce r.f. coupling considerably. This technique has worked particularly well for second-story station installations. As an alternate to the balun, construction of an r.f. choke out of the coax itself is sometimes effective; wind six or more turns of the coaxial cable in a six inch diameter coil. Place the coil at the antenna and wrap it with electrical tape to hold its shape. If there is a moderate to high s.w.r. on the line (2:1 or more), you may find that varying the length of the line helps, although this is a poor substitute for a properly matched antenna.

Experience has shown that the TV monitor itself may be a source or conductor of r.f. interference. Various circuits of the TV monitor (particularly the sweep

circuits) can and do generate r.f. interference which may be heard in the receiver. Also, the video output to the monitor is a wide-bandwidth digital signal with rich harmonic content as is required to produce the crisp character display. If the TV set is poorly shielded (or not at all in some plastic-cabinet models) or lacks proper power line by-passing, the r.f. from the monitor's circuits or from the video output may escape to cause receiver interference. Also, r.f. from the transmitter may enter the monitor and disrupt the monitor or terminal operation. This may be quickly tested by simply disconnecting the video cable from the terminal. There is no substitute for good shielding and by-passing; metal cabinet monitors are highly recommended!

These are some of the r.f.i. suppression techniques that are known to work with digital devices. As we mentioned earlier in the discussion, each r.f.i. problem tends to be unique, and you may have to try some or all of these ideas to solve your own problem. The following is a short bibliography of articles and books where more information about r.f.i. suppression may be found.

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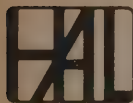
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## RTTY SCOPE

The HAL RS2100 RTTY Scope is an accessory that may be used with the HAL CT2100 Communications Terminal as a deluxe RTTY tuning indicator. The RS2100 includes a miniature 1 inch oscilloscope and gives the standard crossed-ellipse RTTY tuning indication. Also included in the RS2100 is a 175 volt, 60 ma dc loop supply that may be used with the CT2100 for direct connection to teleprinter machines. Although the cabinet of the RS2100 is designed to match that of the CT2100, the RS2100 may also be used as an external RTTY scope or loop supply for a number of other RTTY terminals, such as the DS2050, DS2000, CWR685, CWR6850, CWR670, CWR6700, ST5000, ST-5K, and ST-6K.

### SPECIFICATIONS

#### RTTY Scope Input:

Sensitivity: Approx. 10 v/in to 100 v/in (internally adjustable)  
Impedance: 10k ohms or greater (varies with gain control)  
Connectors: Separate phono connections for horizontal (mark) and vertical (space) inputs.

#### RTTY Scope Controls:

Front Panel: Horizontal Position (H); Vertical Position (V); Intensity (I); Focus (F); Power.  
Internal: X Gain; Y Gain; Astigmatism

#### RTTY Scope CRT:

One inch diameter, green phosphor; 720 VDC maximum cathode to accelerator potential.

#### Loop Supply:

Open Circuit Voltage: 175 VDC, nominal (space)  
Closed Circuit Current: 60 mA, nominal (mark)  
Loop Key Input: Switch to ground; compatible with CT2100 "EXT. LOOP" output or DS2050 "RTTY LOOP" output. Other equipment should employ an NPN transistor switch to ground with mark as the "on" state. Transistor must have voltage rating of 300 VDC or more and current rating of 100 mA or more.

#### Loop Outputs:

Two three-conductor ("stereo") jacks wired to accept either "stereo" or "mono" plugs. TTY machine connections must be isolated from ground.

#### Loop Indicators:

Mark and Space pilot lamps.

#### Power Requirements:

120 or 240 VAC, 50/60 Hz, 18 Watts.

#### Physical Description:

Size: 3.5"H x 8.25"W x 10.156"D (8.9 x 21.0 x 25.8 cm)  
Weight: 9 lbs. (4.09 kg) net; 12 lbs. (5.45 kg) shipping  
Color: Light gray textured top and bottom, black front panel; matches appearance of CT2100 and KB2100.



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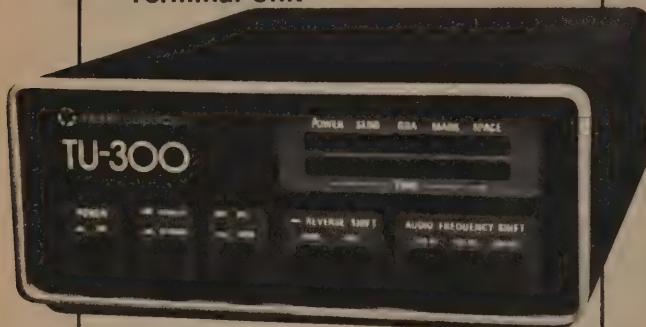


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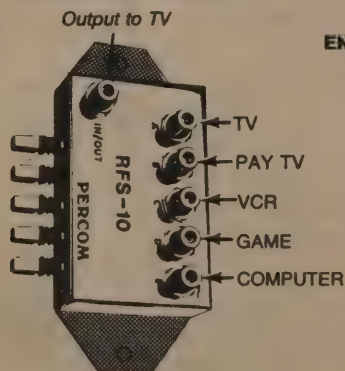
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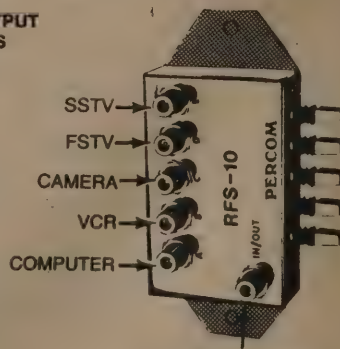
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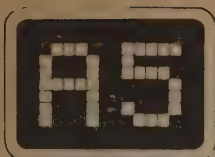
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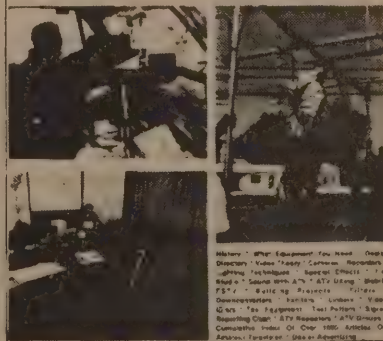
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Plus dozens of news items, features, FCC items, rules and regulations, humor, comics, contests, short articles, hints, ideas, inspiration and other valuable information.



3 Generations of A5 Magazine

Ron Cohen, W3ZKO, Henry Ruh, RB9FO, Mike Stone, WB0QCD



**A5 MAGAZINE "READER QUESTIONNAIRE"**  
**RETURN TO P.O. BOX H, LOWDEN, IA 52255**

Name \_\_\_\_\_ Callsign \_\_\_\_\_ Class of license \_\_\_\_\_

Address \_\_\_\_\_ City (Zip) \_\_\_\_\_

What modes are you active in? FSTV \_\_\_\_\_ SSTV \_\_\_\_\_ RTTY \_\_\_\_\_ FAX \_\_\_\_\_ EME \_\_\_\_\_

Satellite \_\_\_\_\_ Microwave \_\_\_\_\_ Computers \_\_\_\_\_ Other \_\_\_\_\_ HF \_\_\_\_\_ VHF \_\_\_\_\_ UHF \_\_\_\_\_

What mode that you are not into-interest you most? \_\_\_\_\_

What percentage would you like to see in A5? FSTV \_\_\_\_\_ SSTV \_\_\_\_\_ Rtty \_\_\_\_\_

What equipment would you like to see developed by ATV manufacturer's? \_\_\_\_\_

What is your present brand of ATV equipment? \_\_\_\_\_

Preamp? \_\_\_\_\_ Hardline? \_\_\_\_\_ Antennas? \_\_\_\_\_

Are you vertical or horizontally polarized? Vertical \_\_\_\_\_ Horizontal \_\_\_\_\_

What FSTV frequency do you operate? \_\_\_\_\_ Mhz. Sub-carrier? \_\_\_\_\_

On-carrier audio? \_\_\_\_\_ Seperate audio system? \_\_\_\_\_

How many regular ATV stations do you work? \_\_\_\_\_ Best DX miles? \_\_\_\_\_

Best DX Contact (black/white) \_\_\_\_\_ Color \_\_\_\_\_

How far is your sub-carrier been heard? \_\_\_\_\_ On-carrier? \_\_\_\_\_

What frequency do you use for ATV coordination? \_\_\_\_\_ Mhz

FM \_\_\_\_\_ SSB \_\_\_\_\_ Vertical \_\_\_\_\_ Horizontal \_\_\_\_\_ Repeater \_\_\_\_\_

What is the name of your local ATV group? \_\_\_\_\_

Do you operate any ATV Repeaters? \_\_\_\_\_

Are you in favor of recognizing AMSAT 435-436 Mhz. operation and willing  
not to transmit in this area (500 khz.) Yes \_\_\_\_\_ No \_\_\_\_\_ Comments \_\_\_\_\_

Other ATV interference in your area \_\_\_\_\_

Would you be in favor of a non-profit, United States ATV Society? \_\_\_\_\_

Comments \_\_\_\_\_

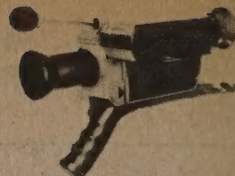
General comments (Things you'd like to see better in A5 Magazine) \_\_\_\_\_



# AMATEUR TELEVISION MAGAZINE

## members' ads

"FREE TO SUBSCRIBERS"



Tired of looking for one of those Winegard 4-bay dipole UHF antennas as shown in the A5 ATV manual or in the April 82 issue? We've got em! Monitor channels 14-82 with this simple array for only \$23.95. We have many UHF-TV surplus TV tuners, meters, cable, amplifiers and filters. Send for "free" catalog, today! ETCO Electronics, North Country Shopping Center, Rt. #9 North, Plattsburgh, NY 12901 - Please say you saw this advertisement in Amateur A5 ATV Magazine! Thanks!

Robot 70 SSTV converter with model 80 camera, includes manuals and cables. Excellent condition (only fell out of the trunk of the car onto the highway at 70 mph one time-QCD) Interested? Call Timmy Hungate (WD9GWE) before 8 pm. (bedtime). 309-694-5495.

For sale; Robot 70A/80 Camera (did not fall out of any cars), all manuals and cables and lense adaptor kit, \$300.00 Contact Lynn Babcock-N7AJB, 5545 West Hatcher Road, Glendale, Arizona 85302. Phone area code 602-937-7013. Great starter system or backup!

Brand new power supply! 12vdc 1 amp, \$25.00-John Greve W9RI, 4211-7th, Rock Island Il.

For sale or trade? SBE-33 for an ATV downconverter or FSTV camera. Terry Wiles, WBØADH, RFD #1, PO Box 40, Plattsmouth, Nebraska 68048. Lets trade! What ya' got?

Homebrew PC ATV rig, DC, Exciter, Motorola PA/heat sink, audio subcarrier, all fixed on aluminum compartments (power supply too!), 10-watt PA out and needs replaced, other wise a working unit! \$150.00! Contact Norm in Decatur, Illinois (WA9HUY). CU at Peoria

ABTOD 5000 ATV transceiver, 15 watts, solid state includes subcarrier and on-carrier audio \$275.00, RCA CMU-15 already converted for video, working, includes AC supply \$75.00, Contact N2BJ Barry Cohen, 21 Frederick St, Garnerville, NY 10923 Phone area code 201-652-1550 after 9 am, 914-947-2876 after 6 pm. Thanks to A5 for the "free" ad!

Attention PET/CBM owners! Over 40 programs available on one disk! All programs are by Robert Baker, author of PETpourri column in KILOBAUD Microcomputing. Available in 4040 or 8050 format disks (specify when ordering), send for list of programs, Entire package for only \$29.00 postpaid US and Canada (Visa and Mastercharge OK, NJ orders add 5% tax, overseas add \$5.00 postage. Baker Enterprises, 15 Windsor Drive, Atco, NJ 08004 Telephone (609) 767-3085 (We have 5 1/4" Diskettes also). Thanks A5!

A5 Classified Ads are "free" to A5 subscribers! Send in yours today and make \$\$\$ now!

Sale on back issues of A5 Magazine! Have March, April, May, June, July, August and September issues 1982 Special \$1.00 each! Add 50¢ postage per issue. Rare copies of A5 from 1973 to 1978 (small editions) not complete (25 issues) \$15.00, add \$2.00 postage, a "few" rejected cover issues of new A5 ATV book (Everything You Always Wanted To Know About ATV\* but were afraid to ask) insides (112 pages) okay, \$5.00, add \$2.00 ppd. A5 ATV Magazine, PO Box H, Lowden, Iowa 52255 (WBØQCD) A5 subscribers only!

Wanted; ICOM IC-RM2 remote controller, will pay top price for mint condition unit. LH Connelly WD4HAL, 215 Garden Road, Palm Beach, Florida 33480

Robot 400, RCA TC1000 Camera & 9" monitor \$825 takes all! Vernon Morrow, KBØSK, 2441 1st Street SW, Cedar Rapids, Iowa 52404 (319) 362-5627



# Full Color SSTV!



Simulated TV picture

## Announcing the K/W SC-422A 3-Memory SSTV Scan Converter System\* ... The World's First FULL COLOR SSTV with Motion Animation and Colorflash!

The K/W SC-422A Scan Converter System now makes it possible for you to transmit and receive both FULL COLOR or BLACK and WHITE SSTV with selectable 128 or 256 pixel resolution!

### FULL COLOR PICTURES CAN BE DISPLAYED:

- \* On an RGB Color Monitor
- \* On a Standard Color TV set with the K/W Color Encoder Model #CE 1101
- \* Or on a Standard Color TV set using a K/W Interface Board.

Color pictures can be put into the three memories of the K/W SC-422A Scan Converter with a standard black and white TV camera using Red, Green, and Blue filters!

A tunable signal sync control assures painting of off-frequency stations without retuning the VFO.

The dual-speed switching circuit between memories #1 and #2 provides motion animation.

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**MODEL 5100-6** Same as above but 24VAC version. Same prices as above.

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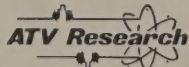
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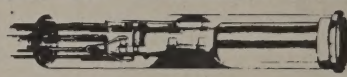
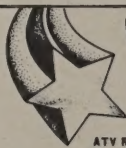
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8929	Industrial grade.....	\$1.00
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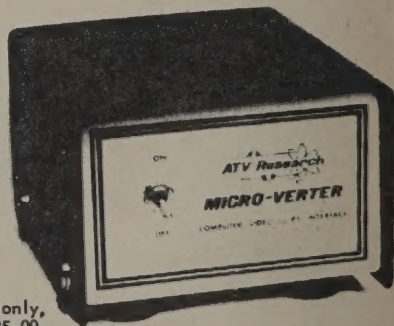
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Pixe-Plexer kit video-audio \$24.50  
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